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BRILL MAGAZINE

SMITHSONIAN

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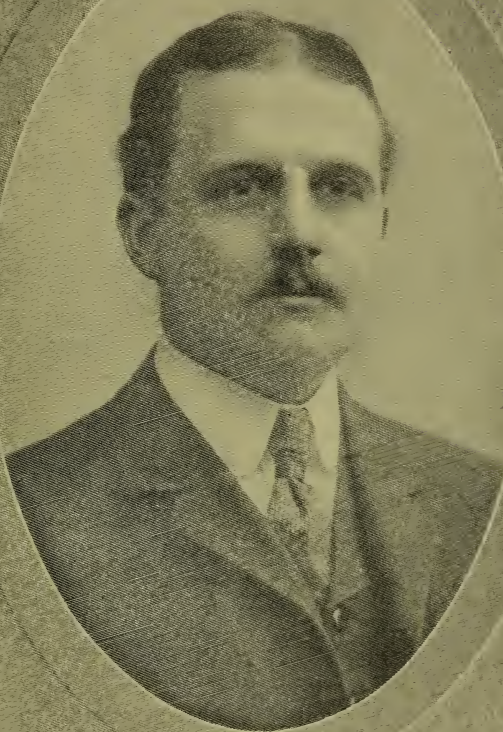
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WILBUR C. FISK

PRESIDENT, HUDSON & MANHATTAN RAILROAD COMPANY

President Wilbur C. Fisk, of the Hudson & Manhattan Railroad, in introducing Dr. William H. Tolman, Director of the American Museum of Safety, at a recent meeting of an association of railway employes, concluded his remarks as follows:

“This railroad is a public utility, and we are public servants, and it is our duty to give the public adequate and prompt service for the fares which it pays to the company; but our first duty, and the most important one of all, is to render that service with the least possible element of hazard. It is our duty to each other to coöperate to the utmost of our ability in making the conditions of employment for ourselves and for each other as safe as may be, and I say to you tonight with all seriousness, that if I personally could pay a price which would guarantee that never again on this railroad one of you men should meet with death or injury in the performance of your duty, there is no price, of which I can think, that I would not be willing to pay.”

JANUARY 15, 1915

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WILBUR CHAPMAN FISK

WILBUR CHAPMAN FISK, President of the Hudson & Manhattan Railroad Company, New York, was born in New York City, February 22, 1868. He obtained his technical education at Princeton University, where he graduated in 1890 with the degree of civil engineer. On leaving the university, Mr. Fisk entered the banking house of Harvey Fisk & Sons, which was founded by his father, the late Harvey Fisk, and, after a thorough grounding in the business, was admitted to membership in the firm in 1898. Within a short time after Harvey Fisk & Sons undertook the financing of the Hudson & Manhattan Railroad Company, Mr. Fisk accepted the office of Vice-President of the company at the urgent request of the directors and William G. McAdoo, then President of the company. In this position, his technical knowledge was of great assistance to Mr. McAdoo in the difficult work of constructing the tunnels under the Hudson River. He held the combined offices of Vice-President and General Manager until March, 1913, when he was elected to succeed Mr. McAdoo as President. He still retains his interest in the firm of Harvey Fisk & Sons. Mr. Fisk is a member of many clubs and commercial and technical organizations, among them being the Railroad Club, the Princeton Engineering Association, the New York Railroad Club, the Traffic Club, the Merchants' Association and the New York Chamber of Commerce. He is also a member of the American Electric Railway Association and an associate member of the American Society of Civil Engineers.

INTERURBAN CENTERS AND INTERURBAN CARS

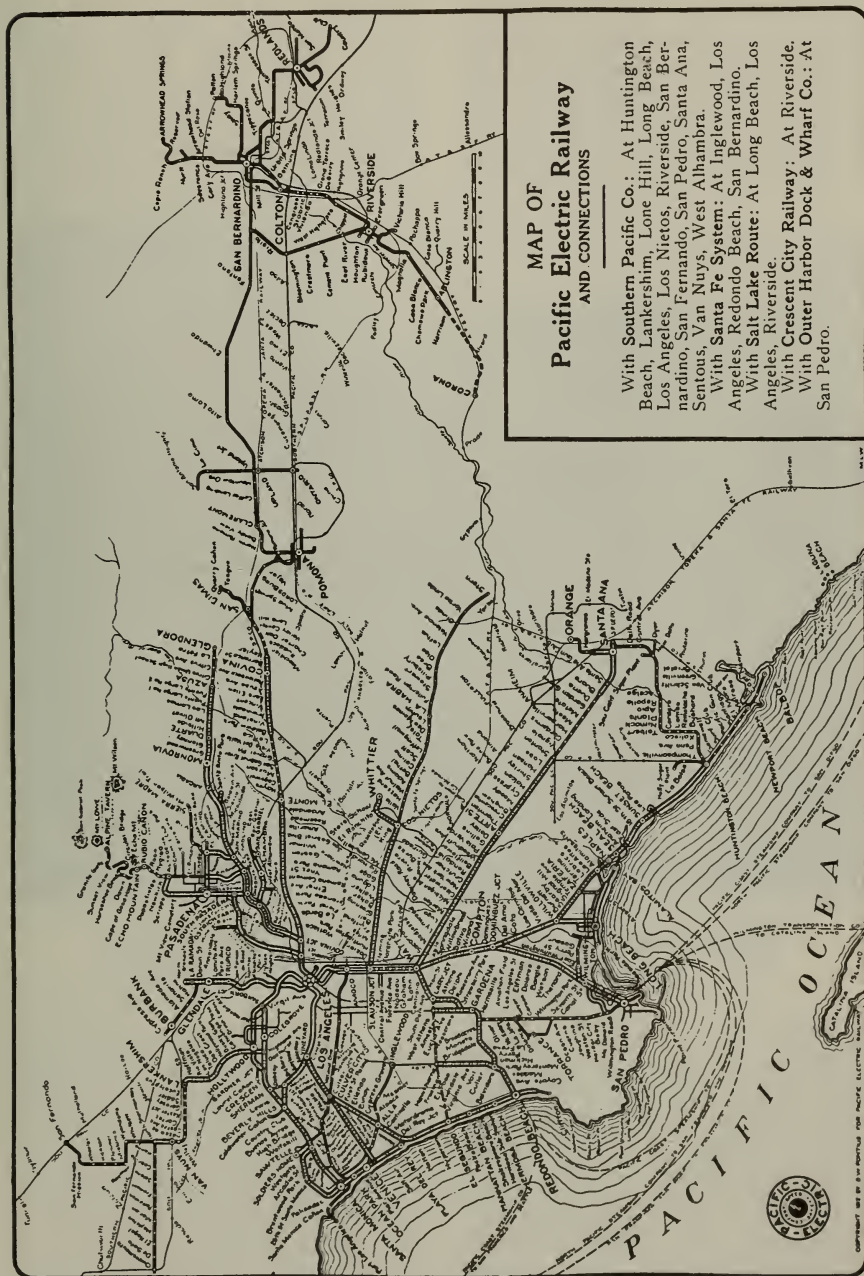
LOS ANGELES

CALIFORNIA is a mountainous State, with ranges extending north and south and paralleling the coast for the most part; but about 150 miles north of the Mexican border there is a break in the direction of the ranges, and one stretches inland at a right angle to the coast for about 100 miles, ending in a group of snow-capped peaks. The broad valley between this range and lower broken ranges to the south, together with an undulating plain along the coast, 50 miles long and from 15 to 20 miles wide, is the Orange Belt of Southern California, a region of mild, delightful climate at all seasons, and of extraordinary fertility. This is the domain of the Pacific Electric Railway System, which links together 42 incorporated cities and towns and a host of smaller towns and villages and ties them to the metropolis. The latest count gives Los Angeles a population of 516,598, and the surrounding district has a population of 750,000, tributary to the interurban lines. The Pacific Electric Railway Company also operates city service cars in Los Angeles, Pasadena, Pomona, San Bernardino, Redlands, Riverside, Santa Ana, Long Beach, San Pedro, and the connecting municipalities of Venice, Ocean Park and Santa Monica. The street railway system of Los Angeles, which is operated by the Los Angeles Railway

Corporation, was the subject of the leading article in BRILL MAGAZINE of November, 1911.

Los Angeles is the chief commercial and wholesale distributing center of the southwest, and in manufacturing alone its yearly output has reached a value of close to \$100,000,000. An enormous export business is carried on in fresh and dried fruits, olives, sugar, wines, petroleum, etc., and is favored by excellent shipping facilities provided by three trans-continental railways and by coast-wise and ocean steamship lines plying from San Pedro, the port of Los Angeles.

The pioneer history of Los Angeles as an interurban railway center dates back as early as 1894, when the lines to Pasadena and Santa Monica were built. These lines were successful, and others were constructed radiating in all directions from Los Angeles and extending between important points in the territory. Most of the lines were consolidated into large systems, and finally, in 1911, the Pacific Electric Railway Company was incorporated to acquire all and operate them under one management. The systems consolidated were the Pacific Electric, Los Angeles Interurban, Los Angeles & Redondo, Los Angeles Pacific, Riverside & Arlington, San Bernardino Valley Traction, Redlands Central, San Bernardino



Interurban, and later the Peck Railroad and the Ontario & San Antonio Heights Railroad. The Pacific Electric Railway is controlled by the Southern Pacific Company.

The Pacific Electric Railway

line from Riverside to Corona, in the eastern part of the system. Other extensions are planned which will serve rapidly developing sections and furnish direct connection between the important outlying points on the different



INTERURBAN CENTERS AND CARS. Rear of Pacific Electric Building. Main terminal station of Pacific Electric Railway System occupies ground floor. Cars of twenty lines either enter and leave at front and have switching facilities on elevated structure at rear, or use the three-track covered-platform terminal shown in foreground

System totals 1045.12 miles of standard gage track, comprising 11.4 miles of four-track line, 284.46 miles of double-track, 308.05 miles of single-track, 104.11 miles of spurs and sidings, 8.77 miles of crossovers, and 9.62 miles of miscellaneous track. The only extension under construction at present is the nearly completed 15-mile

lines. No highways are used outside of cities, as all of the lines are laid on the company's private right-of-way. Roadbed, track and roadway structures closely follow steam railway standards, and the lines are laid with low grades and long-radius curves.

At present 647 passenger cars are available for service, of which

593 are used in normal operation. A total of 2,800 trains, consisting of from one to four cars, are operated daily, and the city service cars of the company average 4,000 trips daily. No trailers are used

nine-story, concrete structure built in 1905 at a cost of one and three-quarter millions. The other is the Hill Street Station, the terminus of six lines running west and northwest. The cars of twenty lines



INTERURBAN CENTERS AND CARS. Hill Street Station, terminus of six lines, and point from which a five-mile tunnel will be driven through hills on western side of city. Operation through the tunnel instead of over city streets will save 15 to 20 minutes' running time. This station is but a few blocks from the Pacific Electric Building, and both are in the center of Los Angeles

at present with the city cars. The maximum speed of the interurban trains is 45 miles per hour, and the number of stops per mile outside of cities is from one to four.

All of the lines radiate from two passenger stations located at the center of Los Angeles. The main station occupies the ground floor of the Pacific Electric Building, a

enter the Pacific Electric Building or the three-track covered-platform terminal at the rear. Trains enter the building at the front on three tracks and, after unloading, proceed out at the rear on an elevated structure provided with crossovers by which they are returned to their proper loading platforms. As the street from which they enter is one



INTERURBAN CENTERS AND CARS. Typical train operated on the heavy traffic lines of the Pacific Electric Railway System. These cars are mounted on Brill 27-M.C.B 3X Trucks

of the busiest thoroughfares of the city, and is also used by the city cars, the congestion is very severe, although greatly alleviated by the adjoining outside terminal, which was built over a year ago. In addition to the land at the rear of

the building occupied by the elevated shunting lines, the company owns private right of way several blocks further and has secured franchises to extend the elevated structure over streets to certain surface lines. When this plan is



INTERURBAN CENTERS AND CARS. The 1½-mile four-track section of the Southern Division ends here at Watts, and three double-track lines diverge just beyond the signal station, shown at the right beyond the crossing. This interlocking signal plant has 73 working levers. Approximately 1500 trains pass this point daily

carried out, trains coming in at the front of the building can unload and load at the same platform and proceed out at the rear on the elevated tracks to other streets, thus eliminating a large part of the congestion and consequent loss of time.

A very important project which the company has in view is the driving of a five-mile tunnel from the Hill Street Station west to Vineyard, in the outskirts of the city. This will be undertaken shortly, as the company possesses the necessary property and franchises and will result in 15 to 20 minutes saved on a number of the heavy service lines to popular resorts on the coast, whose cars are now obliged to enter and leave the city through busy streets.

The train dispatching of the system is made up into four divisions, each having three shifts of two dispatchers per day. The dispatchers' boards are of the company's own design and construction, and are equipped with electric drop signals. Telephone instruments of magneto type are used for train dispatching, and the entire system is covered by telephone circuits. With slight modifications

to meet local requirements, the dispatching system is based on the standard code of the American Electric Railway Association.

Block signals of the three-position type, and having alternating current lights, are installed on the heaviest traffic lines; 67 of these



INTERURBAN CENTERS AND CARS. New block signals on the Venice Short Line. This block system is also installed on the Pasadena Line and will be extended over the entire interurban system

signals are used on the Venice Short Line and 31 on the Pasadena Short Line. It is planned to equip all of the more important lines of the system with block signals. Ten lines are now equipped with electric interlocking signal plants; one of these, at Watts, controls three diverging interurban and local switching lines, has 73 work-



INTERURBAN CENTERS AND CARS. Energy for the Pacific Electric Railway System is supplied from the Southern California Edison Company's 47,000-kw. steam plant at Long Beach (Fig. 1) and 20,000-kw. hydro-electric plant No. 1 on Kern River (Fig. 3); also from the Pacific Light & Power Corporation's 39,000-kw. steam plant at Redondo (Fig. 2) and Big Creek hydro-electric plant No. 1 (Fig. 4) which, with a second plant using the same water, has a combined capacity of 64,000 kw.

ing levers and is one of the most modernly-equipped plants in the country. Approximately 1,500 trains pass this point daily.

The entire system is 600-volt trolley, with the exception of 30 miles of line between Ontario and San Bernardino, a section recently put in operation under 1,200-volt trolley. Several of the lines are of catenary construction, and all new installations and replacements will be of that type. It is also intended in future to employ steel trolley wire, as superior results have been obtained through its use, for a considerable period, on two of the principal divisions.

Energy is supplied to the system by the Southern California Edison Company's power station No. 3 and McNeil plant sub-station at Los Angeles, and by the Pacific Light & Power Corporation's Kern River plant sub-station midway between Los Angeles and Pasadena, and power station at Redondo. It is delivered to the 44 sub-stations and four portable sub-stations at 15,000 volts a. c. 50-cycle. All of the sub-stations are equipped with motor generator sets to secure greater flexibility than is possible with rotary converters. The portable sub-stations are mounted on flat cars and are equipped with 15,000-volt a. c. synchronous motors, 600-volt d. c. generators, and air-operated oil switches for connecting to the lines. The Pacific Electric Railway Company has two large steam-operated power stations, but is not utilizing them at present.

All of the interurban cars of the Pacific Electric Railway System are equipped with four motors and head-end or multiple-unit control; all are of wooden construction with composite underframes and flush platforms and, with the exception of some combination passenger and baggage cars, practically all are half open and half closed, i. e., the open compartment has no window sashes or body-end doors. The older cars have been reconstructed to conform to the newer types and modern service conditions. The number of separate railway systems which operated in this territory prior to the consolidation into the Pacific Electric Railway System is, of course, responsible for the variety of types of rolling stock, but by reconstructing old equipment and standardizing subsequent additions, the number of classes of interurban cars has been reduced, of which five classes are of similar design and differ only in length and in minor details.

The different classes are designated by the numbers painted on the side sheathing. Class 1300 consists of combination passenger and baggage or passenger and mail cars, one of which is shown on page 10. These cars vary in length over bumpers from 37 ft. 5 in. to 44 ft. 1 in.; in seating capacity, from 24 to 32 passengers; in weight, complete with electrical equipment, from 30,000 to 49,000 lb.; the motors are 43 and 52-hp. capacity. These cars are employed on different parts of the system. Class 1000 comprises the more modern interurbans, and are operated on the



INTERURBAN CENTERS AND CARS. Standard interurban car (Class 1000) of the Pacific Electric Railway System. A partition at the center divides the car into two compartments, one having window sashes, doors and upholstered seats, and the other being without sashes and doors and having slat seats

Long Beach, Pomona, San Bernardino, and Santa Ana lines. One of the cars is illustrated above. The length over the bumpers is 55 ft. 6¼ in., and width 9 ft. 4 in.; weight 81,000 lb., fully equipped. They have a seating capacity of 64, and are equipped with 100-hp. motors designed to operate at either

600 or 1,200 volts. Class 800 cars run on the Venice and Santa Monica lines and are similar to Class 1000, but are smaller and lighter, measuring 50 ft. 10½ in. over the bumpers, 8 ft. 10 in. over the sides, and weighing complete 70,400 lb. The motors are 74-hp. capacity and are arranged for 600-



INTERURBAN CENTERS AND CARS. This is an older type of passenger car (Class 1300) used on different parts of the system equipped for handling either express or mail matter



INTERURBAN CENTERS AND CARS. "California" type of car (Class 200) used on certain of the suburban lines. Many of the company's city service cars are of the "California" type, which is well suited to the climatic conditions and very popular throughout the State

volt operation only. Eighteen plush-covered seats in the closed compartment and ten in the open section accommodate 56 passengers. Class 700 cars are used on the 12-mile division between Los Angeles and Pasadena. They are also similar to Class 1000 cars and

are seated for 56 passengers, but measure 49 ft. 2 in. over bumpers, 9 ft. 4 in. over sides, weigh 74,800 lb., and are equipped with 74-hp. motors for 600-volt operation. Class 500 cars also have open and closed compartments like the Class 1000 cars, and are run between



INTERURBAN CENTERS AND CARS. All-steel, low-center-entrance type of suburban car (Class 170) arranged for prepayment fare collection. Twenty steel low-center-entrance city service cars were placed on the Pasadena lines early in 1914, and were built by The J. G. Brill Company

Los Angeles and Redondo Beach, on the Alhambra and San Gabriel Line and the Burbank Line. They have a seating capacity of 48, are 43 ft. over the bumpers, 8 ft. 11¼ in. over the sides, have 52-hp. motors, and weigh complete 58,500 lb. Class 400 is composed largely of older and reconstructed cars

at each end with wire screen guards at the sides. They seat 44 passengers, are 39 ft. 1 in. over the bumpers, weigh 39,800 lb., completely equipped, and use two 57-hp. motors. These cars are in service on the Hollywood and Hollywood-Laurel Canyon Lines. Class 170 cars are of an all-steel, prepay-



INTERURBAN CENTERS AND CARS. Twenty-eight locomotives are employed to haul freight on the various lines. Twelve are of the modern type shown and 16 are of a similar but older design

which are operated on a number of short lines. They have open and closed compartments, vary in length over bumpers from 38 ft. to 45 ft. 9 in., weigh from 48,000 to 58,500 lb., are equipped with 43 and 52-hp. motors, and seat from 44 to 48 passengers.

Of the three suburban classes of cars employed on the system, Class 200 is comprised of a "California Type", i. e., a closed compartment at the center and an open section

ment, low-center-entrance type operated between Pasadena and Altadena. Four motors of 50-hp. each are adapted to operate at either 600 or 1,200 volts. The length over bumpers is 44 ft. 9½ in.; seating capacity 54, and weigh with full equipment 60,500 lb. Class 160 consists of "California" cars of various lengths, most of them having four-motor equipment. These are in service on the Edendale Line, and are similar to those



Orange grove at Lordsburg, on the Pacific Electric Railway System, midway between Los Angeles and San Bernardino



The Pacific Electric lines at Redondo Beach, one of a series of large and popular bathing and amusement resorts along the 50 miles of lines which skirt the coast



Along the docks at San Pedro, the port of Los Angeles

used on the Mount Lowe Line, one of which is shown in the illustration below.

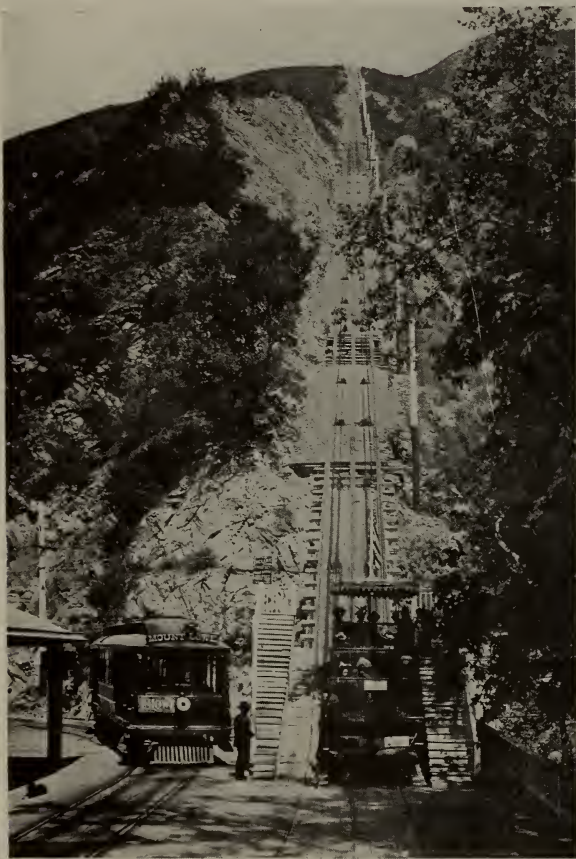
For local service in the cities served by the Pacific Electric Rail-

Twenty-eight electric locomotives are required to haul the freight trains on the various divisions of the system. These are of two classes, the older being

grouped in one class of 16 locomotives, ranging in weight from 52,000 to 98,800 lb., fully equipped; another class of later type weigh 124,200 lb., with the exception of one built at the company's own shops, which weighs 103,300 lb.

Rates of fare vary somewhat on different parts of the system on account of retaining those which were established by the various companies before they were consolidated into the present organization, but the general rate of one-way fares is three cents a mile, and round-trip fares are one and two-thirds of the one-way rate. The low rates at which commutation tickets are sold on all lines has

been an influential factor in the development of the entire region. In addition to the tickets sold at stations, one-way cash fares are collected by conductors, and round-trip tickets between points on the same line can be purchased on cars.



INTERURBAN CENTERS AND CARS. The world-famous Mount Lowe Incline Railway, 3200 ft. long, and the 5-mile trolley line from the top of the incline to the summit, are a part of the Pacific Electric Railway System

way System, "California" cars are chiefly employed, but the latest addition is a low-center-entrance steel type which was described and illustrated in the February, 1914, issue of BRILL MAGAZINE; twenty are in operation at Pasadena.

As Los Angeles is one of the greatest tourists centers of the country, a large revenue is received throughout the year from this source on all the lines. There are numerous sight-seeing trolley trips, including that to Mount Lowe, with its famous incline railway, five-mile mountain-top trolley line to the 6,100-ft. summit; and trips through picturesque valleys with orange groves; along mountain sides with views of snow-capped peaks and the distant sea; along the beaches with their immense amusement resorts; to ancient Spanish settlements with their beautiful mission churches and buildings; to ostrich farms, olive groves, great public and private gardens and parks. A number of special excursion parlor cars and sight-seeing "California" ob-

servation cars, the latter running on regular schedules, are very popular with tourists. The beach resorts attract large crowds on Sundays and holidays, making it necessary to operate many excursion trains on a number of lines.

For the fiscal year ending June 30, 1914, the number of fare passengers carried was 78,332,773, and the passenger car mileage, 26,553,127. The number of tons of freight handled in the same period totaled 1,901,628. By its arrangements with the Wells-Fargo Express Company, the company forwarded during 1913, 340,908 packages or pieces of material and received 227,305, and these figures do not include interline matter and matter handled between points outside of Los Angeles, of which no figures are available.

NEAR-SIDE CARS FOR MANSFIELD, O.; HAGERSTOWN AND FREDERICK, MD. DOUBLE-END OPERATION

A NUMBER of Near-Side cars delivered recently to the Mansfield Railway, Power and Light Company and to the Hagerstown and Frederick Railway Company are identical and are of special interest because of being equipped for double-end operation. While Near-Side cars for double-end operation, both for single- and double-truck service, have been built, double-end operation for cars of this type is still novel and of special interest in con-

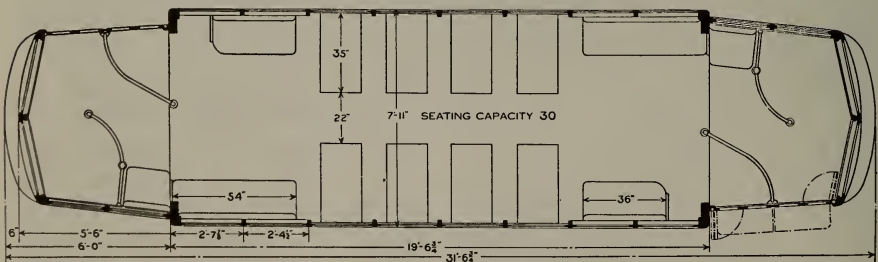
nection with its application to the conditions of traffic on the railways where they have been installed. While it is, of course, more desirable to have Near-Side cars operated at one end only, so that the body may be longer and the rear end used for seating space, still on lines not equipped with turning facilities at the termini and double-end operation is necessary, the rear platform is not waste space, as during peak load periods it is utilized by standing passen-



SINGLE-TRUCK NEAR-SIDE CARS. Near-Side car for double-end operation. Same type as furnished to Hagerstown & Frederick Railway. Mounted on Brill 21-E truck

gers. It is undoubtedly of great advantage to have the entrance and exit doors operated by the motorman and have entering and leaving passengers under his observation, freeing the conductor of the responsibility of operating doors, watching passengers coming and going, and signaling at a time when he is busy collecting fares. As will be seen by the illustrations, these recent shipments of cars have platform and door features of standard Near-Side design. There is a double handle for operating the doors separately or together, and if a conductor is used in addition to

the motorman, his position is on the platform, where the illustrations show a seat. Except during rush hours, it is not necessary, as a rule, to use both motormen and conductors on short Near-Side cars; in some cases they are operated entirely by one man. At the termini the doors at both ends can be opened to facilitate quick unloading; this can be done to greater advantage when a conductor is used, as he can go to the rear end on approaching the terminal and be ready to open the door. After the passengers are all out, the motorman will close the doors at what



SINGLE-TRUCK NEAR-SIDE CARS. Height from underside of side sills over trolley boards 8 ft. 8 1/2 in.; floor to center of headlining, 8 ft. 5 1/2 in.; track to step, 15 in.; step to platform, 14 1/4 in.; platform; platform to floor, 7 in.; ramp 2 in.; weight of carbody, less electrical equipment, 11,420 lb.; truck, 5820 lb.

has been the front end, while the conductor, who is now at the other end, is at the proper position to collect fares from incoming passengers.

The cars have the Brill semi-convertible window system with the

broad use and the entire satisfaction given in large cities, notably Philadelphia, where 1,500 double-truck Near-Side cars have been in operation for several years. Vitiated air is removed by means of six Brill "Exhaust" ventilators,

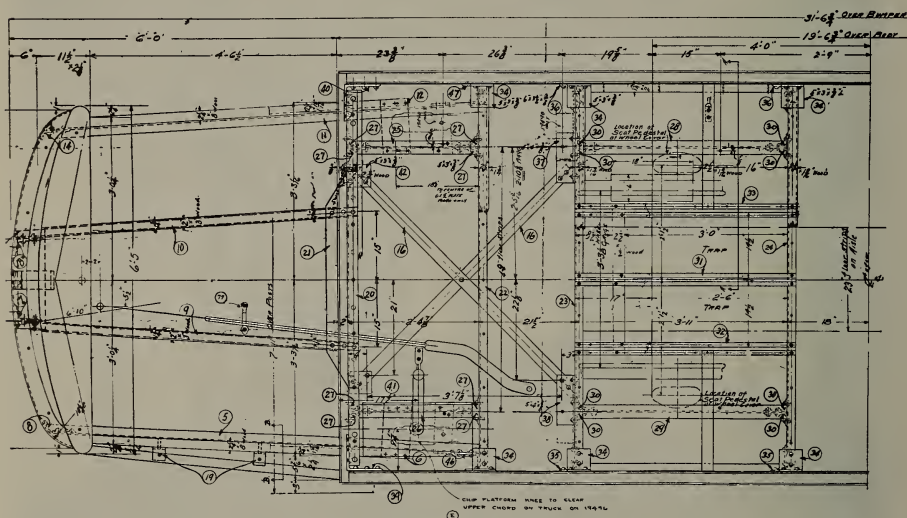


SINGLE-TRUCK NEAR-SIDE CARS. The windows are of the Brill semi-convertible type with hinged joint between upper and lower sashes. Four Brill "Exhaust" ventilators in body ceiling and one in each platform hood

upper sash hinged to the lower and both sliding into roof pockets, freeing the window openings entirely of sash and adapting the car for summer service. Congestion at the ends is reduced by longitudinal seats occupying the space of two windows, and that this congestion does not interfere with the success of the Near-Side type is practically demonstrated by its

four in the body roof and one over each platform.

The underframes are built of steel with 15 by 3-16-in. side plates, reinforced by a bar at the top and an angle at the bottom. Channel crossings are attached to the side plates and angles with special brackets of large dimensions, and are substantially secured to I-beams, which rest on the upper



chords of the truck. There is a diagonal bracing at each end, which, with a horizontal reinforcing plate, prevents deflection of the end sills from any shocks that the bumpers may receive. The Brill 21-E Truck, on which all of these

cars are mounted, have truss pipes from the ends of the under tie rods of the side frames to a secure anchorage close to the end sills, forming an additional support against the leverage exerted by the overhang of the long platforms.

18

“CALIFORNIA” TYPE OF CAR FOR SACRAMENTO

BRILL 76-E TRUCKS

THE latest addition to the equipment of the Sacramento lines, which are owned and operated by the Pacific Gas and Electric Company, of San Francisco, consists of six cars of the type illustrated, built by the American Car Company. Sacramento is on a river of the same name, about 75 miles northeast of San Francisco, and has the same mild climate as the coast cities of the State; therefore the “California” type of car, which is popular

throughout the region, is the standard of the railway system. During the day most of the passengers prefer the open sections of the car, but as the doors and windows of the central compartment can be left open, there is little difference as to comfort, and the central compartment has the attraction of spring cane-upholstered seats, while those in the open sections are of the slat type; but it is at night that the closed compartment is necessary, because of the



“CALIFORNIA” CARS FOR SACRAMENTO. The closed compartment has drop sash windows, single sliding doors, ventilating sash in the monitor deck and spring cane-upholstered seats.

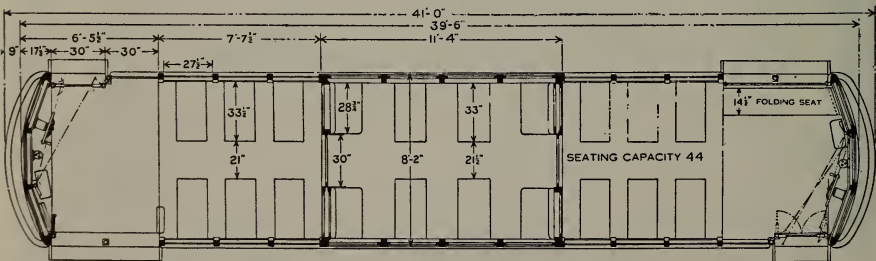


"CALIFORNIA" CARS FOR SACRAMENTO. The climate of California permits open cars to be used throughout the year, but cool evenings at all seasons require the closed compartment. Cars are mounted on Brill 76-E trucks.

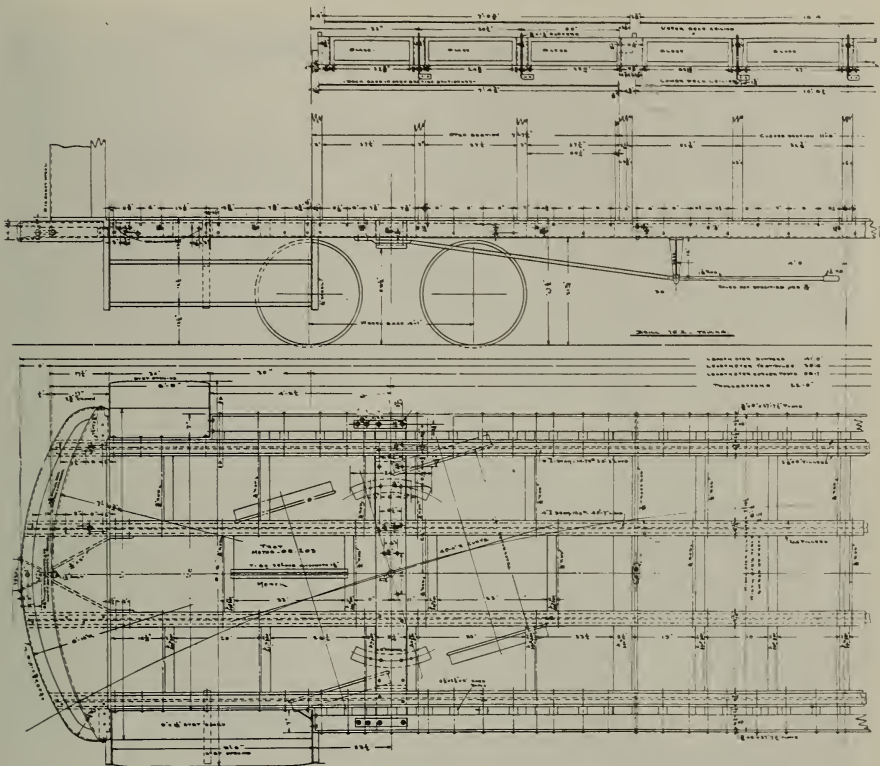
cool winds that blow after sun-down. As the evening advances it gets cooler, so that most of the passengers prefer the closed compartment; as this is after the evening rush hour period, the compartment, with its capacity for 18 seated passengers and standing room for nearly as many more, meets the requirements. Weather-proof curtains, capable of being drawn to the floor, protect the open sections during inclement weather. An interesting feature of the seating arrangement is the long bench which folds against the vestibule corner

post at diagonally opposite corners of the car, and is put in use at the front end. A similar seat could be used at the rear opposite the entrance-exit, but is evidently not needed under the local traffic conditions, and the space is doubtless used to advantage for standing passengers.

The cars are mounted on an excellently designed composite underframing consisting of four I-beams, two at the center, spaced 27 in. from center to center, and two near the side sills; all four have wooden fillers and extend



"CALIFORNIA" CARS FOR SACRAMENTO. Height from track to side sills, 2 ft. 7½ in.; from side sills over trolley boards, 8 ft. 11¼ in.; floor to center of headlining, 8 ft. 0½ in.; track to step, 12½ in.; step to step, 12½ in.; step to platform, 12½ in.; weight of carbody, including electrical equipment, approximately 19,000 lb.



"CALIFORNIA" CARS FOR SACRAMENTO. Four I-beams with wood fillers and wooden side sills with steel plates on outside are the longitudinal members of the underframe.

from bumper to bumper. The wooden side sills are plated on the outside, with 5 by $\frac{5}{8}$ -in. steel. Built-up plate bolsters have the upper plate bent down at each end to carry the outer I-beams and side sills. Longitudinal truss rods under the side sills, and lateral truss rods at the king posts, reinforce the central part of the underframe. By reference to the diagram of the underframe, it will be readily realized that the I-beams furnish a strong support to the overhang at each end, and that the placing of the outer I-beams has been governed by the step arrange-

ment. The side posts are tenoned and strap-bolted to the side sills, and are of straight grained ash of the same configuration as the closed-compartment panels. Wire screens with channel frames are placed between the posts of the open sections, and also have the same sweep as the posts. Ash is used for the interior finish and the slat seats in the open sections. All the seats are of Brill manufacture. Other Brill specialties are folding gates, signal bells and alarm gongs, vertical brake wheels, angle-iron bumpers, etc.

Trucks of the Brill 76-E type are

employed, and have a wheel base of 4 ft. 7 in., 30-in. wheels, and are equipped with GE-203 motors. The trucks are arranged to clear on a 40-foot. radius curve. The 76-E

type of truck has the Brill Graduated Spring System for light and heavy loads, which is explained in an article on page 28 of this issue of BRILL MAGAZINE.

STEEL EXPRESS CAR AND SNOW PLOW FOR ALBANY SOUTHERN RAILROAD

BRILL 27-M.C.B.3X TRUCKS

THE Albany Southern Railroad Company operates a third-rail, double-track system on the east side of the Hudson River, running from Albany through a fertile and populous farming district to Hudson, a distance of about thirty miles, and connecting a number of the more important towns and small cities of this region. An important feature of the company's business, and one which has been well developed over a considerable period, is the transportation of express matter between Albany and the various points on the line; or to Hudson

for transfer to New York via New York Central Railroad. The company has lately added to its equipment, for handling express matter, the interesting type of car built by the Wason Manufacturing Company and shown in the illustrations. It is adapted to supplement the snow-fighting cars of the system by an equipment of removable snow shares and ice flangers. Heavy snowfalls are common to this region, and it is necessary to maintain highly efficient equipment to prevent interference with the schedules during the winter.

By glazing the upper parts of



EXPRESS CAR FOR ALBANY SOUTHERN RAILROAD. Car has removable equipment of snow plows arranged to be raised and lowered by air. Removable snow flangers are provided for the trucks. Car mounted on Brill 27-M. C. B. 3 X trucks.



EXPRESS CAR FOR ALBANY SOUTHERN RAILROAD. With exception of interior lining and flooring, the car is of all-steel construction. Motorman's compartment at each end.

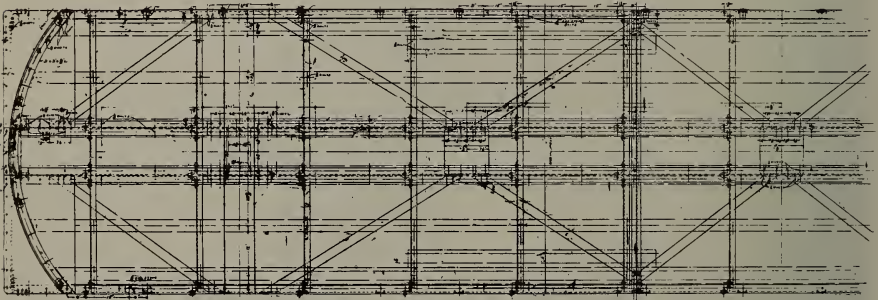
the two 5-ft. sliding doors and by providing the windows at the center, the interior is given plenty of light, even though the motorman's compartment at each end cuts off the illumination from two of the three drop-sash end windows. The underframe is constructed of two 10-in. 35-lb. I-beam center sills,

10-in. 25-lb. channel side sills, 9-in. 21-lb. I-section needle-beams, 6-in. 8-lb. channel crossings placed at 3-ft. centers, and 10-in. 25-lb. channel end-sills. Substantial brackets, gusset plates and 3 by $\frac{3}{8}$ -in. diagonal braces are used in the construction. Truss-type steel bolsters, with 10 by 1-in. top and bot-

tom plates and cast steel fillers, are 30 ft. 8 in. from center to center.

The side posts, end posts, rafters and side plates are of structural steel, and the outside sheathing to the eaves is of 1/8-in. steel plate. Steel T-shape rafters, with wooden fillers, support the plain-arch roof, and are riveted to the angle-steel top plate, to which the posts are also secured. Yellow pine is used for the interior lining, and the flooring is double, with yellow pine

they are 5 ft. high, 5 ft. 6 in. long, and 8 ft. 4 in. wide. The couplers are removed when the snow plows are installed. Air-operated ice flangers, capable of cleaning ice and snow between the rails to the depth of 2 1/2 in. below the top of the rails, extend outside the rails as far as the widest part of the truck, and are located on the outside end of each truck. They are equipped with removable shoes, and are designed for severe service



EXPRESS CAR FOR ALBANY SOUTHERN RAILROAD. Length of body over vestibules, 43 ft. 8 in.; length of vestibule, 4 ft. 2 in.; width over sills, 8 ft. 0 in.; extreme width, 8 ft. 2 1/4 in.; height from track to side sills, 3 ft. 2 in.; height from side sills over trolley boards, 9 ft. 3 3/4 in.; height from floor to under side of rafters, 7 ft. 9 1/4 in.; track to step, 18 in.; step to step, 14 in.; step to floor, 18 3/4 in.; weight of body, less electrical equipment, less air brakes, 30,600 lbs.; weight of trucks, 19,600 lbs.

under maple. The motorman's cab doors and central windows are 2 ft. wide, and the sliding doors have openings 5 ft. wide and 6 ft. 8 in. high. The doors are of wood inside the car.

The plow shares are arranged to be raised and lowered by compressed air, and are powerfully constructed, with structural steel backing and steel facing plates;

conditions. Brill 27-M. C. B. 3X trucks carry the car, and have 34-in. rolled-steel wheels, 6-ft. 6-in. wheel base, 5 by 9-in. M.C.B. journals, and are equipped with GE-214 motors. Air brakes of Westinghouse AMM type, vertical-wheel hand brakes are included in the equipment. M. C. B. standard couplers fit the car for hauling freight cars.

The capacity to serve is the capacity to succeed.

STORAGE-BATTERY CARS FOR BRANCH OF THE LONG ISLAND RAILROAD

COMBINATION AND STRAIGHT PASSENGER TYPE

THE storage battery cars illustrated were recently delivered to the Long Island Railroad by The J. G. Brill Company, for use on a branch line between Mineola and Valley Stream, a run of about ten miles. Mineola is an important junction on the Long Island Railroad system, about twenty miles from the company's terminal in Brooklyn. Valley Stream is a junction on the

southern division of the system, and an important transfer point to Far Rockaway and other beaches on the south coast, served by the railroad.

The cars were ordered through the Railway Storage Battery Car Company, of New York, and are equipped with Edison batteries and mounted on "Continental" type of trucks. They are of two types, one for passengers only and the other



STORAGE BATTERY CARS FOR LONG ISLAND RAILROAD. Interior of straight passenger cars showing vis-a-vis seats. Battery cells are placed on insulated trays under seats and ventilated through the floor.

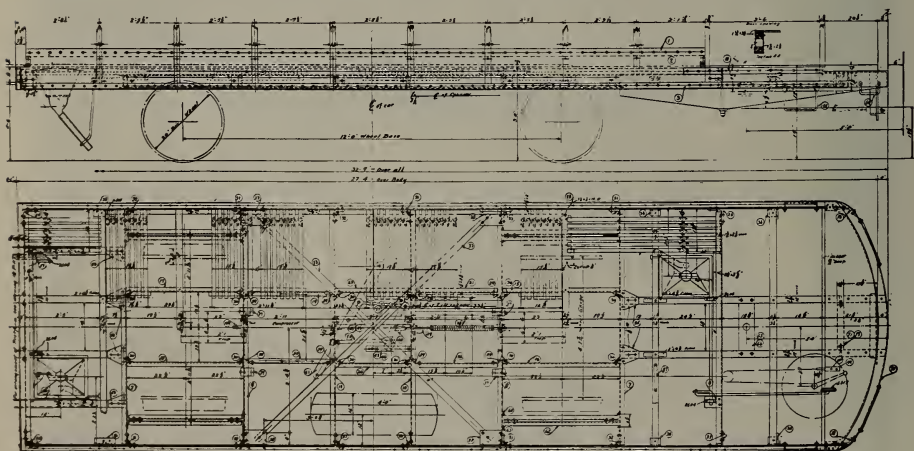


STORAGE BATTERY CARS FOR LONG ISLAND RAILROAD. Cars have train doors at center of both vestibules. There are manually operated doors at both sides of platforms. Pedestals gear trucks are of "Continental" type.

has a baggage compartment at one end; both have the same dimensions and the same design of underframe.

The underframes are constructed to carry the load on the side sills, which are made up of 16 by 3/16-in. plates, with flat bar reinforcement at top and angle at bottom.

The end sills are composed of 8-in. channels bracketed to the side sill plates and angles; 5-in. crossings are placed at each side of the wheels and two at the center. The diagonal braces at the center are of 2 1/2 by 1/4-in. plate and are gusseted to the junction of the channel crossings and side plates; 4 by 3



STORAGE BATTERY CARS FOR LONG ISLAND RAILROAD. All-steel underframe of combination cars. Length over corner posts, 22 ft. 7 in.; over platforms, 32 ft. 9 in.; width over sills, 8 ft. 0 in.; width over posts, 8 ft. 3 3/4 in.; extreme width, 8 ft. 4 in.; width of aisle, 2 ft. 0 1/2 in.; height from track to side sills, 2 ft. 3 1/2 in.; track to step, 15 in.; step to platform, 15 in.; platform to floor, 6 in.; weight of body, truck and equipment, less motors, air brakes and storage batteries, 25,000 lb.



STORAGE BATTERY CARS FOR LONG ISLAND RAILROAD. The cars with baggage compartments are of the same dimensions as the straight passenger cars.

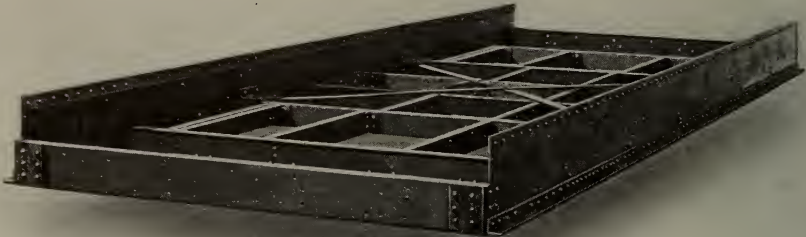
by $\frac{1}{2}$ -in. angles are used for the platform knees.

The upper construction is framed with $2\frac{1}{4}$ -in. side posts,

tenoned into a wooden member placed on the outward-extending angle at the bottom of the side sill plates, and bolted to the plates.



STORAGE BATTERY CARS FOR LONG ISLAND RAILROAD. Interior of baggage compartment showing stationary seats under which battery cells are placed.



STORAGE BATTERY CARS FOR LONG ISLAND RAILROAD. Steel underframe without platform knees. The underframes of both types are alike with exception of flush extension for baggage compartment cars.

The corner posts are $3\frac{7}{8}$ in. and the vestibule corner posts $3\frac{1}{4}$ by $5\frac{1}{4}$ in. Ash is used for the entire framing material and is also used for the interior finish. It will be noticed that train doors are provided in the vestibule and that body-end bulkheads are omitted for lightness.

The pedestal running-gear is arranged for a 4 ft. 8-in. track, and has a wheel base of 12 ft.; the wheels are 30 in. in diameter, and the journals are $4\frac{1}{4}$ by 8 in. Mo-

tors of 25 h. p. each are mounted on each axle, and the cars are equipped with Westinghouse Multiple Unit Control, Type PK, with master controller at each end. The battery cells are installed under the seats in trays placed on special porcelain insulators. They are of the Edison type and consist of 230 cells, ventilation is provided by a slat construction of the floor under the seats. These batteries call for a normal charging current of 436 volts at 30 amperes.

THE BRILL 77-E TRUCK FOR LOW-LEVEL CARS

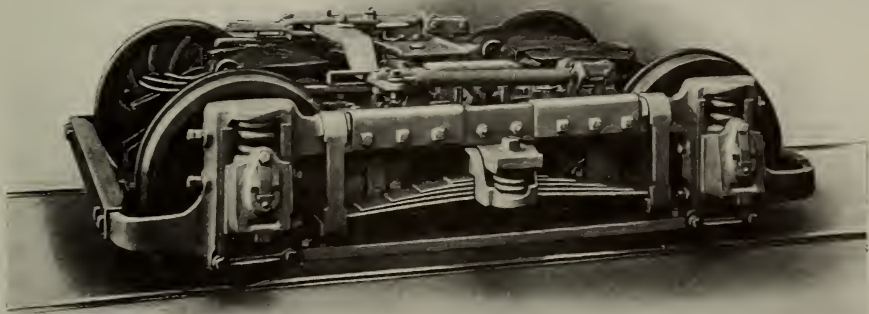
TO provide a motor truck for low-level cars, The J. G. Brill Company has adapted one of its most recent types of city trucks to operate with 22-in. or 24-in. wheels and inside hung motors. Solid forged side frames, which are fundamental in Brill truck construction, are distinctly advantageous in a low truck, as they take up

a minimum of space and are capable of being secured to the transoms by wide gusset plates, which are folded over and bolted through the middle part of the side frames. Also they have the width of surface necessary for reinforcing the connection of the transoms with double-corner forged brackets. The end extensions of

the side frames are bent around the wheels, and furnish an ample surface to be double-bolted to the angle end frames. A channel tie-bar, double-bolted at each end to a foot, which is an integral part of the inner pedestal, and short tie-bars between each pair of pedestals, prevent pedestal deflection from brake pressure. There is ample space in the yokes for the proper height of journal springs, which provide whatever equalization is necessary; or, in other words, allow the wheels to rest on different levels without affecting the horizontal position of the frame or subjecting it to twists.

Having no truss bars or other such frame members, and having the requisite strength, enables the requisite strength, enables the swing links to be placed on the side frames at wide-apart points and close to the yokes. At the bottom of the links are bearings for semi-elliptic bolster springs. Be-

tween the semi-elliptic springs and the bolster are interposed coil springs, which only act under a light load. This combination of plate and coil springs forms what is known as the Brill Graduated Spring System, since it graduates the spring motion according to the load carried. The coil springs are placed in a seat casting, which in this low truck straddles the semi-elliptic spring band and has a spring on each side. The ends of the bolster are formed to cap the springs, and come in contact with the elliptic spring band when the springs are compressed three-eighths of an inch. When the car has between half and a full load of seated passengers, the parts referred to come in contact and the coil springs stop acting, after which the semi-elliptics, being friction springs and slower acting, cushion the heavier load on the truck frame, and the frame in turn is

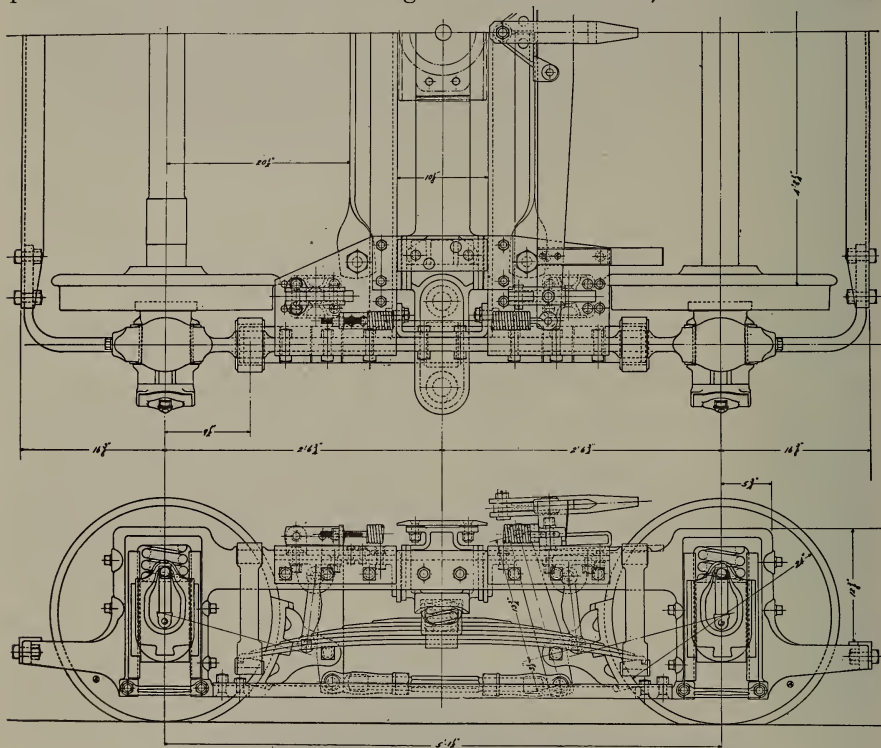


MOTOR TRUCK FOR LOW CARS. Brill 77-E truck arranged for small diameter wheels and small inside-hung motors. The spring system is graduated for light and heavy loads.

cushioned on the axles by journal springs.

The brake rigging is practically the same as has been standard on some other types of Brill trucks for a number of years, and includes patented "Half-Ball" brake hang-

sible to the pivotal center of the truck. The motor supports are suspended to the transom gusset plates by means of motor bolts with top and bottom suspension springs, and a truck of this type with a 5-ft. 1½-in. wheel base



MOTOR TRUCK FOR LOW CARS. Plan and side elevation of Brill 77-E truck showing coil springs interposed between the semi-elliptics and the bolster.

ers. Slots for the upright levers are cut in the gusset plates, which are made extra wide and heavy for this purpose, and the live levers are connected by a horizontal lever arched at the center for motor clearance. The pull rod clevis is attached to the center of the horizontal lever by means of a triangle-shaped casting to bring the pivotal point as close as pos-

sible to the pivotal center of the truck. The motor supports are

suspended to the transom gusset plates by means of motor bolts with top and bottom suspension springs, and a truck of this type with a 5-ft. 1½-in. wheel base will take a pair of 30 hp. motors. From the illustrations and this description, it is evident that the 77-E truck has all the superior operating and easy riding features of the Brill center pivotal trucks for standard-size wheels, and that nothing has been sacrificed in any part in adapting the truck to small-diameter wheels and small inside-hung motors.

SUGGESTIVE SUBJECTS

NOTE.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

COURTESY ALWAYS

DON'T be curt—be courteous.

The slogan for conductors—Caution, Courtesy, Conscience.

Courtesy is a combination of good manners, cheerfulness, patience and self-control.

A courteous conductor is one who knows when and how to give the "soft answer that turneth away wrath."

Common courtesy is expected. Uncommon courtesy is unexpected. What is uncommon and unexpected makes an impression.

The times when a conductor finds it hardest to be courteous are the very times that he needs it most.

A conductor who practices the genuine brand of courtesy doesn't need to be told that it pays.

If in back of the cap-badge bearing the word "Conductor" is a courteous, self-controlling mind, then the face below the visor is bound to show it.

The company needs promoters—those who promote safety, efficiency, self-control and courtesy. Be a promoter and be in line for promotion.

You conductors are the Reception Committee of this company, and each is delegated to receive hundreds of our patron-guests daily. The cars are the reception rooms, and instead of shaking hands you take fares. Please look and act the part of a member of the Reception Committee under all circumstances, remembering that the company owes every possible courtesy to each patron-guest and has chosen you as its personal representatives in this important service.

BOOSTS

"LIVE wires" are fellows who have connected themselves up with "live wires."

Of course every man who is holding down a job knows that he is expected to be dependable. Then, in the name of common sense, why doesn't every man set himself to earn and keep a reputation for absolute dependability!

Most of the successful men in the electric railway business today have worked their way up out of the ranks by their grit and perse-

verance in mastering themselves and their jobs and by having the sense to think ahead.

The man who jumps out of bed every morning with his mind set on being cheerful all day, no matter what happens, will return home at night feeling bully.

The man whose wife and children rush delightedly to welcome him home at night has won the best thing in the world simply through his own kindness and unselfishness.

Lots of men "can take a drink or let it alone"; it is the man who wants to take a drink and won't who has something to brag about, but he is in too big a hurry to get home with all of his wages to stop and brag.

In a brass band, the first cornetist gives the note to tune by, and every player brings up his instrument to the same pitch; then they all get to work, with the leader beating time. Same with a railway organization—the department chief sounds the right note for everyone to play up to, and the manager waves the baton. The point is—everybody get in tune and keep in time. The result is—harmony and inspiration.

Are you really onto your job? Is there anything you don't know about it? You are sure that you have learned all there is in it? Good! Then there is nothing in the way of getting your mind going on something bigger. Haven't time! But you don't have to study your own job any longer. Are you satisfied to stop there? All right, if that's your size. But if you're ambitious and are thoroughly onto your whole job and everything that is connected with it, you will aim straight at the next better job and be fitting yourself for it.

What are we working for? Money. What will money buy? Home, food and clothing. What more? Insurance to provide against sickness and death. What more? Education. Anything more? Yes, but we must save the balance, except what our good sense permits us to spend for amusement. Can all this be done out of the earnings of the average working man? Let us look around and find the thrifty, debtless, steady, happy men who are making good on the same earnings we receive. Life isn't all one glad song with them, but they know how to live within their earnings and get what they need for mind as well as body, and for those dependent on them. They are thinking ahead, getting thinking heads, and will keep on getting ahead. Any real reason why we shouldn't do likewise?

CHANGES OF ADDRESS

THOSE who receive BRILL MAGAZINE are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.



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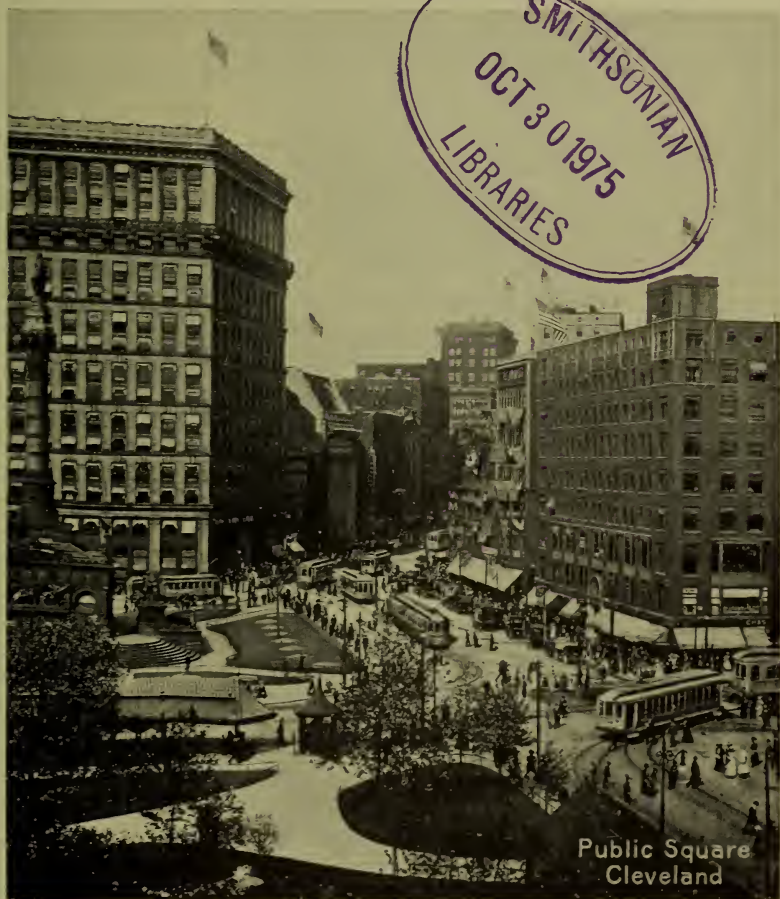


BRILL CENTRIFUGAL SPRINKLING CAR

THE "Centrifugal" has been the standard Brill power sprinkler for ten years, and has therefore had plenty of time to thoroughly demonstrate the correctness of its principles and firmly establish the details which combine to make it the most efficient in pressure, range and control of water, and in low cost of operation and maintenance. The motor-driven centrifugal pump supplies a uniform pressure at the sprinkling heads sufficient to distribute water to the curb of wide thoroughfares. The sprinkling heads are arranged to permit the sprinkling or flushing of the right-of-way only, whenever desired. Gate valves stop the water instantly. Write for "Centrifugal" catalog.

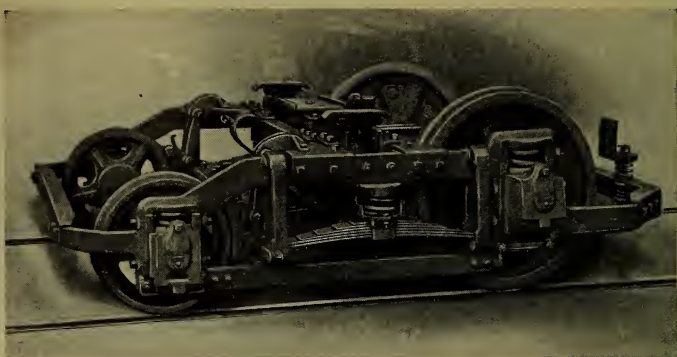
THE J. G. BRILL COMPANY, PHILADELPHIA

BRILL MAGAZINE



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BRILL SINGLE-MOTOR TRUCK

THIS is the 39-E type of single-motor truck that has been chiefly used under new cars for city service during the last few years, and till a year and a half ago was considered to be completely developed, with apparently no possibility of improving it in any part. However, a great improvement was made at that time—a practical method of carrying the lightly-loaded carbody on soft-acting coil springs, without changing the plan of the truck as it stood. A Brill invention, and adopted as a standard feature of all Brill double-trucks for city service. This feature met with instant favor, and now a large number of railways are reporting excellent results. As cars run with a light load most of the time, it is obviously important to have a spring arrangement capable of carrying them smoothly instead of having the harsh motion commonly experienced with spring systems made to carry maximum loads. The Brill Graduated Spring System means that bolster coil springs are automatically put in action under light loads.



Arthur Mott

STREET RAILWAY COMMISSIONER OF CLEVELAND, OHIO

Between the car riders who own the streets, and private companies having tracks therein, a constant, and at times a bitter, struggle takes place. The spring from which flows this stream of trouble is the failure of both to understand each other. The former demands a maximum service for a minimum fare, while the latter gives a minimum service for a maximum fare. Both are wrong! The principle that all must accept is, that the service shall be rendered at cost. Cost in this instance must be limited, for the car riders contribute the biggest part of the joint undertaking, that is, a monopoly use of the street for transportation purposes. Private enterprise depending upon public rights must not expect the public to furnish the means of its own undoing. The public must not expect private enterprise, though enjoying special privileges, to give something for nothing.

PETER WITT.

FEBRUARY 15, 1915

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PETER WITT

PETER WITT, Street Railway Commissioner of Cleveland, Ohio, was born in Cleveland, 1869. He was City Clerk during four successive administrations of Mayor Tom. L. Johnson, from 1903 to 1910. His comprehensive knowledge of taxation and kindred subjects led Mayor Johnson to appoint him head of a tax investigation. He was made Street Railway Commissioner by Mayor Newton T. Baker, January 1, 1912, and is still serving in this capacity. The scope of the duties of Street Railway Commissioner of Cleveland is very broad, and includes the planning and supervision of extensions, routing, schedules, rates of fare, ordinances controlling tracked streets and car operation in general. Mr. Witt was the originator of the alternate-stop plan, which has increased the railway schedule from ten to twelve miles per hour, and has revolutionized the handling of peak loads. He was the originator of the Cleveland Center-Entrance Trail Car, which has had much to do with bringing trail car operation into prominence during the last few years. He is responsible for the scheme of "pay-leave" which has been in general service in Cleveland for a number of years, and has resulted in overcoming the severe congestion at the Public Square, in the center of Cleveland, from which all lines radiate, and also at all terminals. In actual service the "pay-leave" method of loading and unloading cars has been demonstrated to be equivalent to the doubling of the capacity of the lines at terminals. Mr. Witt is well known as a speaker on city railway transportation, public relations and economics.

INTERURBAN CENTERS AND INTERURBAN CARS

CLEVELAND

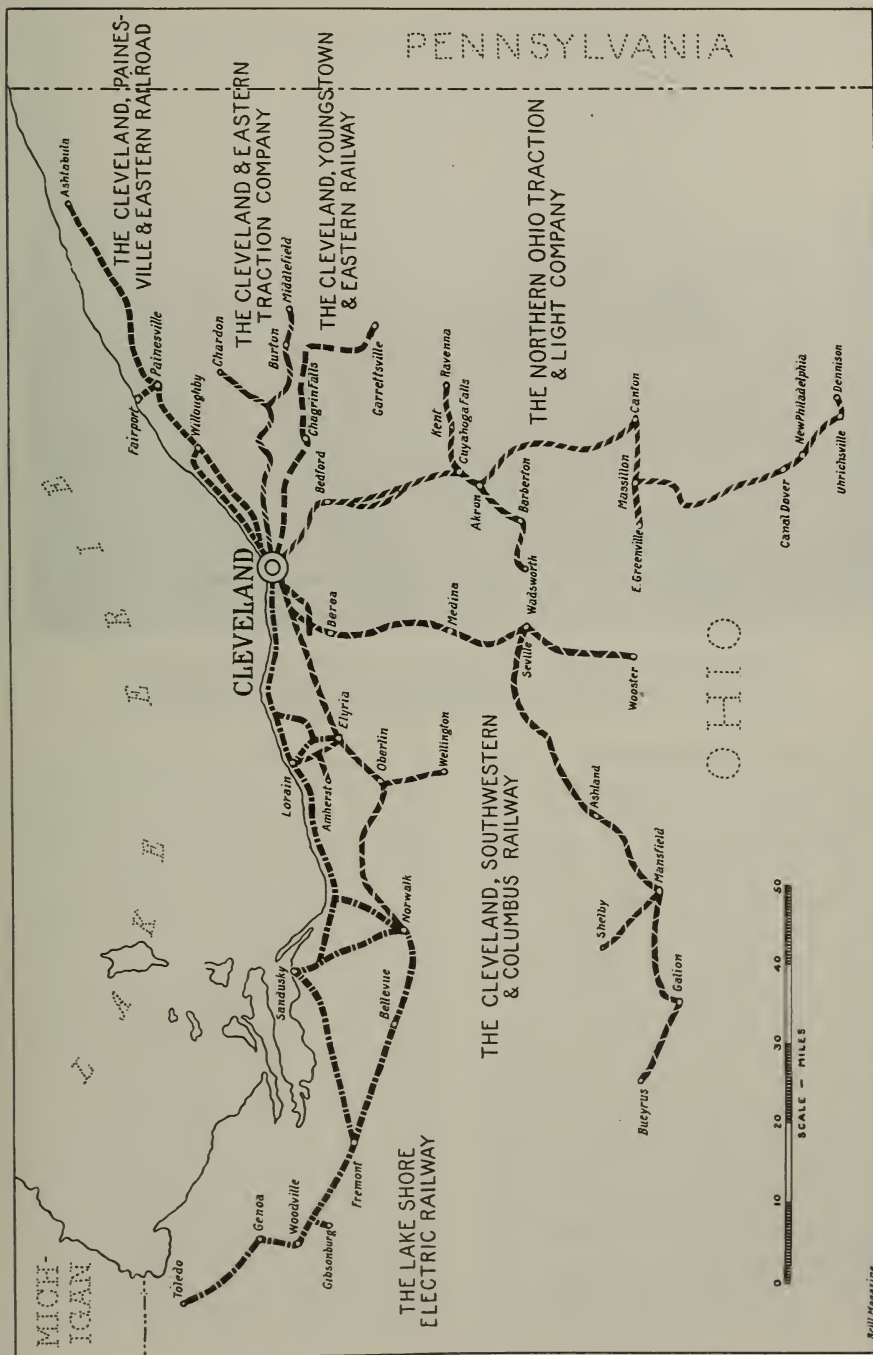
THE city of Cleveland, Ohio, on the southern shore of Lake Erie, is the commercial and distributing center and port of northeastern Ohio. Eight trunk lines serve the city, and a large amount of grain, ore and coal is received or shipped by both rail and water. The surrounding country consists chiefly of undulating, fertile farm lands, and is thickly dotted with thriving cities and towns. The fact that this section is in the natural gas belt, and has abundant watercourses adds much to its advantages as a manufacturing region.

Cleveland has a population of 650,110, and a wide, closely populated suburban belt reaching around from shore to shore. For the last 20 years a great factor in the development of the region has been the interurban electric railway systems, which one after another have linked the cities and towns with the metropolis, till practically all of the territory, needing this form of transportation, was pre-empted by a large number of operating companies which have been gradually consolidated into six interurban systems.

The cars of all six systems enter Cleveland over the lines of the Cleveland City Railway Company, and all converge in the Public Square at the center of the city, sharing parts of the four loops of lines within the square with the

city railway company. While this bringing of all the electric cars of the city and surrounding territory within a limited space is a disadvantage in regard to creating congestion, its advantage in the convenient transfer of passengers from one line to another is obviously of immense importance to the general transportation situation. The interurban passenger station at the southwest corner of the Square is used for the ticket offices and waiting rooms for all of the lines. The cars on each of the systems run on an hourly schedule, leaving the Square every hour from early morning till midnight, and all cars stop at the Square only long enough to discharge and receive passengers.

The express business of the electric lines in and around Cleveland, with the exception of two interurban systems, is conducted by the Electric Package Agency, an association owned by the Cleveland Railway Company, the Lake Shore Electric Railway Company, the Cleveland, Southwestern & Columbus Railway Company, the Northern Ohio Traction & Light Company, and the Cleveland, Painesville & Eastern Railway Company. This business was started in 1898 and has arrangements with the large express companies for transferring the matter coming and going to points outside its own territory. The Electric Package Station





INTERURBAN CENTERS AND CARS. The outer lines of the Public Square are included in the four railway loops around adjacent blocks used by all cars entering the city, of the six interurban systems which converge at Cleveland. Most of the cars of the Cleveland City Railway use the loops within the Square

is near the business center, and the warehouses are commodious and equipped with all facilities for the convenient handling of materials. A part of the station is used by the Cleveland & Eastern and the Cleveland, Youngstown & Eastern Railroad Companies for their express and freight business. The financial operations of the agency are entirely separate from the general operations of the railway companies; it collects its own revenues and after paying expenses, divides the balance of the earnings among the companies represented, in proportion to the length of haul of the packages carried.

The territory along the lake shore east of Cleveland is served by

the Cleveland, Painesville & Eastern lines, with which is affiliated the Cleveland, Painesville & Ashtabula R. R., forming a system of sixty miles of single track and five miles of double track lines, and having Ashtabula, a city of 25,000 population, as its eastern terminal. A number of the towns along the lines have populations of about 2,500, and midway is Painesville, lines have populations of about Main Line time table, fifteen stations are listed, with a service of nine local and six limited through cars daily each way, and eleven local and two limited cars over part of the route daily between Cleveland and Painesville; making in all a daily shedule of 58 trips.



INTERURBAN CENTERS AND CARS. The interurban passenger waiting rooms and ticket offices for all lines occupy the ground floor of the building to the right of the one from which the photograph was made. Cars of all lines leave the Public Square every hour. The Square is at the center of the business district

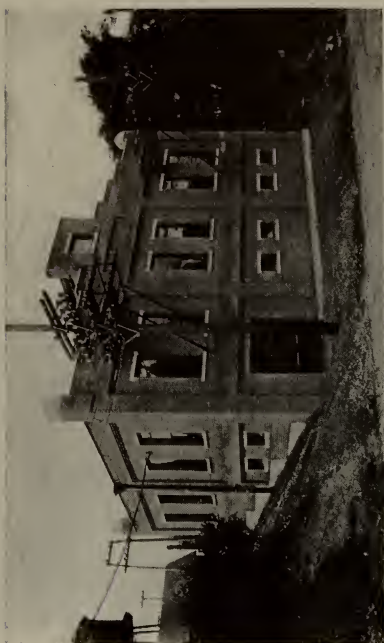
On the Shore Line Division six stations are shown on the time table, and 26 runs form the daily schedule, making connections at Willoughby, the eastern end of this division. The baggage and express service is mostly conducted by seven cars running east and four west on a regular daily schedule. Willoughbeach Park, on the shore of Lake Erie, is owned by the railway company, and is a station on the Shore Line. Connections are made at the Public Square with the city cars and with the other interurban lines, and at Ashtabula with the Pennsylvania & Ohio Railway, running east along the lake shore; other interurban lines connect through to Buffalo. The traffic is

largely suburban into Cleveland, and on the Main Line there is considerable traffic into Ashtabula and centering at Painesville. In the winter schedule 18 cars are operated, and 24 in summer; in all 42 cars are available for service. They are run at a maximum speed of 60 miles per hour, and the stops average five to eight per mile.

The company's power station is located at Painesville, and substation, repair shops and general offices at Willoughby. During the past year the company carried a total of 3,652,200 passengers, or a daily average of 1,006; the number of passenger car miles operated for the year was 1,229,750, a daily average of 3,370. The express car



Passenger station with executive offices of the Cleveland, Painesville & Eastern Railway at Willoughby



Steel bridge, 644 ft. long, over highway at Willoughby



Sub-station at Willoughby. The central power station is at Painesville

Interior of the Willoughby sub-station



INTERURBAN CENTERS AND CARS. Standard type of interurban car of the Cleveland, Painesville & Eastern Railway. Length over vestibules, 50 ft.

mileage for the year was 133,220, a daily average of 365 miles.

Running directly east from Cleveland is the line of the Cleveland & Eastern Traction Company to Middlefield, a distance of 39 miles, and having nineteen stations on the route. Twenty-five miles from Cleveland an 8-mile line branches to Chardon, a town of 1,400 population, and having three towns on the division. The system comprises in all 41 miles of single track. The cars are run singly on an hourly schedule from the Public Square, Cleveland, to Gates Mill, a distance of 17 miles, and every other car runs through to Chardon and makes connection at the Junction for all points on the division ending at Middlefield. The baggage and freight service consists of three cars from Cleveland to Gates

Mills, two to Chardon and two to Middlefield, daily.

With the exception of three miles, all of the lines are laid on private right-of-way. Out of fifteen passenger cars available for service, twelve are employed in normal operation. The maximum speed is 45 miles per hour and the average number of stops is four per mile. The cars are of the same type as those used on the Cleveland, Youngstown & Eastern sys-



INTERURBAN CENTERS AND CARS. Interior of the above car. Seating capacity, 52. The smoking compartment seats 16

tem. Popular resorts on the lines, which add largely to the summer traffic, are at Bass Lake, Chesterland Caves and Punderson's Lake. The method of fare collection consists of the division of the system into zones of $2\frac{1}{2}$ miles each with a five-cent cash fare per zone. For the year 1914 the number of fare passengers carried was 928,990 and the car mileage 479,971. The number of tons of freight carried

line, and is visited by large numbers throughout the season. Freight is handled on the lines in carload and less-than-carload lots. The traffic statistics for the year 1914 were: Number of fare passengers carried 623,192; car mileage, 256,484; tons of freight carried, 10,500.

Running almost directly south of Cleveland is the system of the Northern Ohio Traction & Light



INTERURBAN CENTERS AND CARS. Type of car used on the Cleveland & Eastern and the Cleveland, Youngstown & Eastern systems. Length over vestibules, 43 ft. 1 in. Seating capacity, 46. The smoking compartment seats 16

totaled 15,500 pieces for the year.

The lines of the Cleveland, Youngstown & Eastern Railway Company run in a southeasterly direction from Cleveland to Chagrin Falls, a distance of 12 miles. The line is all of single-track, uses the highways for eight miles and has four miles of private right-of-way. An hourly schedule is maintained, with seven cars of the type shown on this page, and four other cars of the same type are available for extra service. A maximum speed of 45 miles per hour, with four stops per mile, maintains the schedule. Chagrin River Falls is the attractive scenic feature of the

Company, with its southern terminus at Uhrichsville, about 80 miles distant. The system centers at Akron, which has a population of 100,000; the company operates the city lines here and also at Canton, which has a population of 60,000. There are eight towns on the lines, having a population of from 4,000 to 15,000, and the number of stations given in the time table is 51; in addition there is a tributary population of about 50,000. Except for short distances, the lines are all on private right-of-way outside of the cities, and amount to 236 miles of single track and 70 miles of double track, including the



Dam on the Cuyahoga River which forms a reservoir for the Gorge Power Station of the Northern Ohio Traction & Light Company

The Gorge Power Station. Present rating, 20,000 kw. Ultimate rating, 50,000 kw.

Hydro-electric plant one-half mile below the dam

Sub-station at Macedonia, on the $7\frac{1}{2}$ -mile cut-off. This section is equipped with catenary trolley



Typical two-car train of the Northern Ohio Traction & Light system. The latest cars measure 51 ft. 7 $\frac{3}{4}$ in. over vestibules

city lines at Akron and Canton. At Canton the lines connect with the Stark Electric Railroad, which runs eastward through Alliance to Salem.

Energy for the lines north of Canton is supplied from a steam plant on the Cuyahoga River, just south of Cuyahoga Falls, and known as the Gorge Power Station. The dam, which provides water for condensing purposes, helps to furnish a head of water for a supplementary hydro-electric plant, a mile down the river. Together, the plants have a present rating of 22,000 kw., and the steam plant an ultimate rating of 50,000 kw. The current for this part of the system is transmitted at 22,000 volts to eight substations. A power station at Canton supplies the southern divisions, and in addition these stations furnish electricity for lighting and power in the cities, towns and villages along the routes. Large new car repair shops are centrally located near Akron.

The cars are operated at 500 volts trolley,

using four motors per car of 65 and 75-hp. capacity each. The passenger cars used in normal operation number 265, and 300 cars are available. The cars are run either singly or in trains of two at a maximum speed of 55 miles per hour, and average four stops per mile. The limited trains running between Cleveland and Akron, a distance of 40 miles, make four stops be-

tween terminals. Other types of equipment employed are six baggage cars, two line cars, five work cars, four ballast cars, one wreck-car and six sweepers.

The summer traffic is largely supplemented by a number of resorts, including Silver Lake Park, Chatauqua Park, Meyers Lake and Park, Lakeside Park and Casino at Summit Lake, the Gorge near Akron, Wyoga Lake, Long Lake, the Reservoir Lakes, Turkey Foot Lake, Springfield Lake, Brady Lake and Sandy Lake. Last year the number of passengers carried on both the city and interurban lines of the system was, in round numbers, 55,000,000.

The southwestern part of the territory is served by the lines of the Cleveland, Southwestern & Columbus Railway Company, which operates two main divisions, with branches from each. One of these divisions, known as the



INTERURBAN CENTERS AND CARS. Interior of standard car of the Northern Ohio Traction & Light Company. Seating capacity, 54. The smoking compartment seats 16

Western, has its terminus at Norwalk, 58 miles from Cleveland, passing through the university town of Oberlin, where a branch runs south to Wellington. At Elyria, the population of which is 15,000, a branch runs north to Lorain, a city of 29,000 population, on Lake Erie, where connections are made with the Lake Shore Electric Railway; another branch extends south from Elyria eight miles to Grafton. The Southern Division of the lines has its terminus at Bucyrus, which has a population of 10,000, and is 115 miles by the lines from Cleveland. Connection is made from Bucyrus through to Columbus by the Columbus, Marion & Bucyrus Railway and the Columbus, Delaware & Marion Railway. A branch at Seville extends to the town of Wooster, and another branch to Shelby from Mansfield, a city of over 20,000 population, where the city system,



INTERURBAN CENTERS AND CARS. Standard car of the Cleveland, Southwestern & Columbus Railway. Length over vestibules, 57 ft. 9½ in.

the Mansfield Railway, Light & Power Company, is controlled by the company. The number of stations shown on the time table for the system is 58, and the entire territory is thickly populated.

There are 210 miles of single track and 7 miles of double track mostly on private right-of-way outside of the cities. The cars are operated singly and run at a maximum speed of 60 miles per hour, with from three stops per mile to nine miles per stop. The number

of interurban cars in normal operation is 36, a total of 50 being available for service. In addition the company operates 10 cars in city and suburban service, one private car, one funeral car, nine baggage cars, four line cars, two work motor cars, four snow plows, and two sweepers.

In 1914 the number of fare passengers carried was 6,952,909, and the car mileage 3,418,707. In the same year the freight carried amounted to 24,092,025 tons and the express matter 2,500,000 pieces. The lines reach a number of popular resorts, including Flemings Falls, between Ashland and Mansfield; Seccaium Park, between Galion and Bucyrus; Puritas Springs Park, between Cleveland and Chippewa Lake, 36 miles from Cleveland on the Southern Division. The main power station and the repair shops



INTERURBAN CENTERS AND CARS. Interior of the above car. Seating capacity, 66. The smoking compartment seats 16

are centrally located at Elyria.

Along the shores of Lake Erie west of Cleveland extend the lines of the Lake Shore Electric Railway, with its western terminus at Toledo, 120 miles from Cleveland by the railway. The running time between Cleveland and Toledo on limited trains, which are operated

resorts along the shores and on the islands of Lake Erie served by the lines are at Cedar Point, Lakeside, Put-in-Bay Island, Middle Bass Island, Kelleys Island, Sages Grove, Mittawanga, Rye Beach, Beach Park, Crystal Beach, and Linwood Park.

There are 185 miles of single



INTERURBAN CENTERS AND CARS. A view on the 20-mile double-track section of the Lake Shore Electric lines between Cleveland and Lorain

at two-hour intervals in both directions, is four hours and twenty minutes; through local trains are run every hour. Connections are made at Elyria with the Cleveland, Southwestern & Columbus; at Norwalk with the Sandusky, Norwalk & Mansfield Electric; at Fremont with the Fostoria & Fremont Railway; at Woodville with the Lake Erie, Bowling Green & Napoleon; at Genoa with the Toledo, Port Clinton & Lakeside. The summer

track and 20 miles of double track; about three-fourths of the trackage is on private right-of-way. The largest cities along the lines are Lorain, Sandusky, Norwalk and Fremont, which with the other cities and towns served have a combined population of about 100,000. Lorain has a population of 30,000, and its railway system is controlled by the Lake Shore Electric.

Limited trains of two cars each, equipped with multiple-unit con-

trol, operate over the main division of the system, while single cars are used for the local service. Through cars are operated twice daily each way between Lima and Cleveland over the Western Ohio, Toledo, Fostoria & Findlay and Fostoria & Fremont railways; and connections are made with the interurban lines centering at Toledo. About 30 cars out of an

Among recent improvements on the system have been the erection of a number of steel bridges.

The foregoing shows that the six interurban lines terminating at Cleveland have a combined track-age of nearly 1,000 miles, placing the city in the front rank of inter-urban centers. While a number of the lines were among the earliest of the interurban era, and



INTERURBAN CENTERS AND CARS. Lake Shore Electric standard car. Length over vestibules, 60 ft. Seating capacity, 60

available 70 are used in normal operation. The maximum speed is 60 miles per hour, and the number of stops per mile about four. The fare passengers carried in 1914 numbered 6,000,000, and car mileage 2,780,000.

Beach Park, at the center of the eastern portion of the system, is the location of the power station; the other is at Fremont, a central position for feeding the sub-stations of the western division. Repair shops are at both of these points and also at Sandusky, where the general offices are situated.

nearly all the mileage has been operated for many years, the tracks, roadbed and bridges, the overhead equipment, the signal systems, the power plants and transmission lines, the rolling stock and maintenance facilities, have been improved and modernized from time to time and present as a whole a vast up-to-date net-work of safe, attractive and efficient high-speed transportation lines, entirely capable of fulfilling the requirements of the highly developed and progressive territory and cities of northern Ohio.

228 CARS FOR THE CHICAGO SURFACE LINES

39-E SINGLE-MOTOR TRUCKS

AN order for 228 cars for the Chicago Surface Lines is nearing completion in the shops of The J. G. Brill Company. These cars are of similar design to a lot of 100 furnished early last year and described in the May, 1914, issue of BRILL MAGAZINE. The differences are principally in the steel underframe and the door-operating mechanism. In the former order, the sides were slightly curved and the side girder plates of the underframe were 18 inches high at the center and tapered at the ends, and inside truss bars were used to brace the overhand; while in the present type the sides are straight and are 12 ft. long. They are of regular girder construction, consisting of steel plates $9/64$ in. thick, 30 in. wide, and the two end plates being 11 ft. long and the center are reinforced with steel angles at top and bottom and constructed as a whole with the necessary rigidity to enable them to carry the entire load to the bolsters. In addi-

tion to the 4-in. channel crossings, the underframe is tied across and braced by diagonal flat bar members. Ten-inch channel end sills are heavily bracketed to the side girders and relieved of whatever buffing shocks and coupling strains the car may receive by a diagonal bracing of the platform members. Well-designed cast steel body bolsters are spaced 22 ft. $1\frac{1}{2}$ in. from center to center. The car



CARS FOR CHICAGO SURFACE LINES. The steel covering is removed from the door-operating mechanism to show the electrical device for lighting signal lamps in front of motorman, indicating doors open or closed



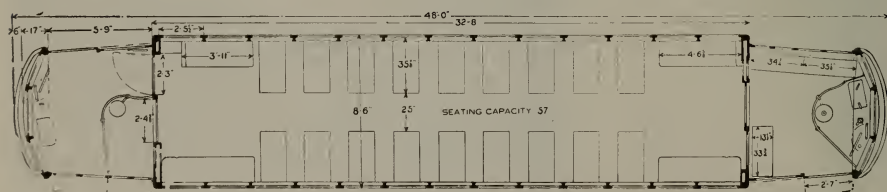
CARS FOR CHICAGO SURFACE LINES. The car is shown with its equipment of storm sashes. Four louvres in the side plates admit fresh air to electric heaters; vitiated air is exhausted through a roof chamber by motor-driven fan. Brill 39-E Single-Motor Trucks with Graduated Spring System

floor at both ends has a ramp of 3 in. from the platform to the bolster.

Ash side posts, $2\frac{5}{8}$ in. wide and $3\frac{9}{16}$ in. deep at the belt railing, are mortised and tenoned into the side sills, resting on and strap-bolted through the side girder bottom angle. Composite carlines support the plain arch roof; bulkhead headers of ash are cut out in order to reduce weight, and the bulkheads are also of ash, with an enclosed T-iron center post.

The side windows are provided with pockets between the letter panel and the ceiling for the lower sashes, enabling them to be raised

their full height. These sashes have brass stiles and top and bottom rails. The upper sashes are stationary and have wooden frames. The corner and side posts are fitted with locks designed to hold wire-mesh screens or storm sashes, according to requirements of the season. In the vestibules, the lower sashes of the end windows drop into pockets. Sheet steel is used for the inside paneling of the vestibules. The entrance and exit doors are of the two-leaf folding type, one hinged to the vestibule corner post and the other to the body corner post. The doors are paneled with glass for about



CARS FOR CHICAGO SURFACE LINES. Height from track to underside of side sills, 2 ft. 9 in.; underside of side sills over trolley boards, 8 ft. 11 in.; floor to center of headlining, 7 ft. 8 $\frac{5}{8}$ in.; track to step, 13 $\frac{1}{2}$ in.; step to platform, 12 $\frac{1}{4}$ in.; platform to floor, 10 $\frac{1}{4}$ in.

two-thirds of their height, and are operated separately or in unison in conjunction with folding steps by means of a mechanism within easy reach of the conductor's position. This mechanism is partly shown in the engraving on page 47. The bulkheads are fitted with

"Winner" type, and are fitted with grab handles; hand straps are provided over the longitudinal seats. The diagram also shows the platform railing for prepayment purposes and arranged to be readily moved to enclose the motorman's position.



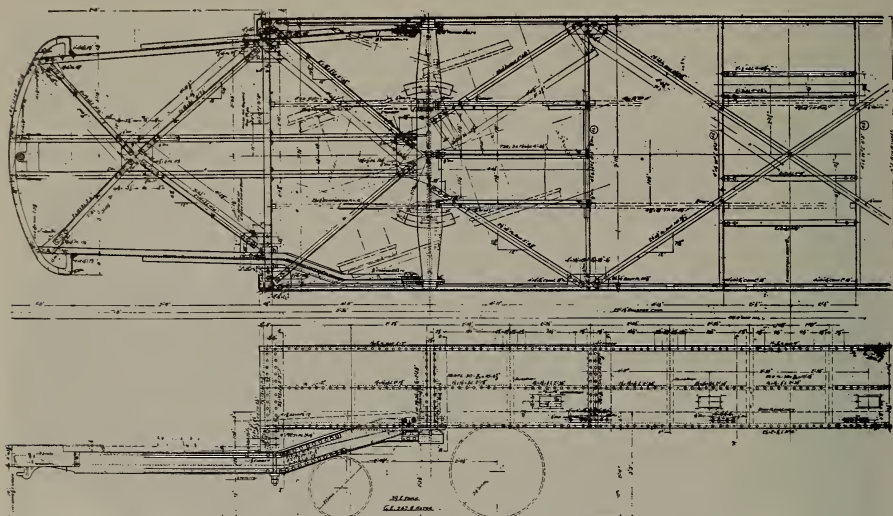
CARS FOR CHICAGO SURFACE LINES. The upper sashes are stationary; roof pockets permit the lower sashes to be raised their full height

one swinging and one sliding door.

The opposite diagram shows the seating capacity to be 57, which includes 6 passengers on the platform folding seats. In the carbody the transverse seats accommodate 36; 3 of the longitudinal corner seats have room for 4 passengers each, and the one next to the body entrance door seats 3. The transverse seats are of the Brill

The ventilating system consists of intake louvres in the side girder plates, through which air is admitted to the electric heaters under the transverse seats; vitiated air is exhausted through registers in the ceiling into a roof chamber extending the full length of the carbody and expelled through roof louvres by means of a motor-driven fan.

All the cars, like those of the



CARS FOR CHICAGO SURFACE LINES. The side plates are $\frac{3}{8}$ -in. thick and 30 inches high. Floor has a ramp of 3 inches from platform to bolster

former order, are mounted on Brill 39-E trucks, having the Brill Graduated Spring System, which enables the cars to ride as smoothly with light loads as with heavy

Substantial life guards are built around the ends of the trucks, covering the open space below the truck end frames to afford extra protection.

STEEL CENTER-ENTRANCE CARS FOR CITY AND SUBURBAN SERVICE

WILKES-BARRE RAILWAY COMPANY

SIX cars of an interesting steel center-entrance type have been placed in operation on one of the lines of the Wilkes-Barre Railway Company, Wilkes-Barre, Pennsylvania, since the first of the year. The type is an adaptation of the low-center city cars to high-speed suburban service and is the first to be carried on 6-ft. wheel base interurban type of trucks and yet have a stepless center platform. This is accomplished by depressing

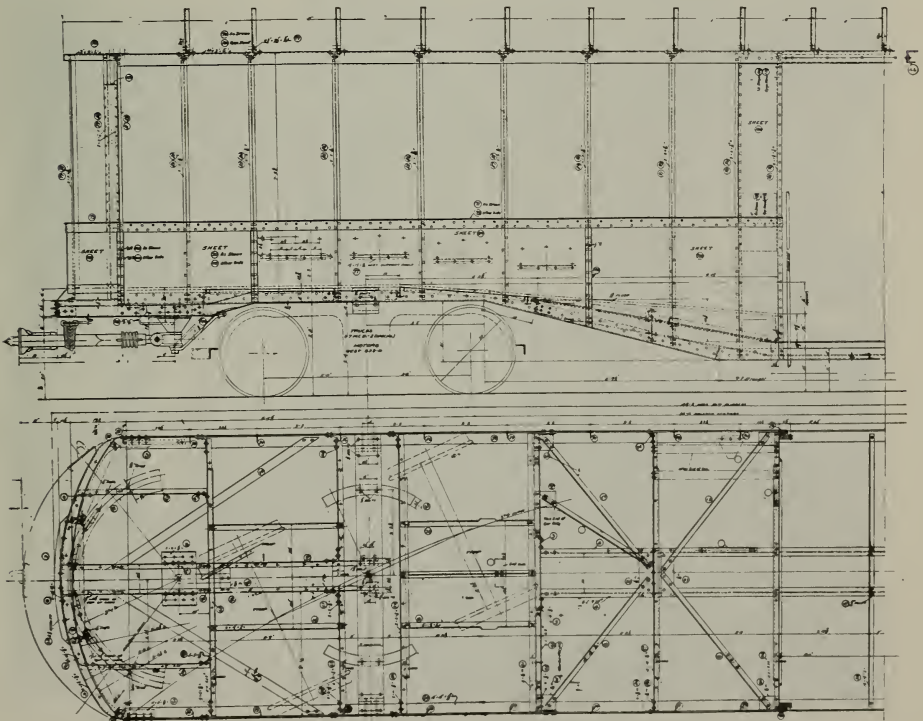
the side members from 2-ft. 8-in. clearance at the trucks to 11 in. from the track at the center, making the step height 15 in. from the track to the step tread.

The side members are composed of 4 by 4 by $\frac{3}{8}$ -in. angles, and together with $\frac{3}{32}$ -in. side plates, reinforced at the top by steel belt rail and by the tee-post construction, from the side girder. The sides are additionally strengthened by the use of a steel angle top

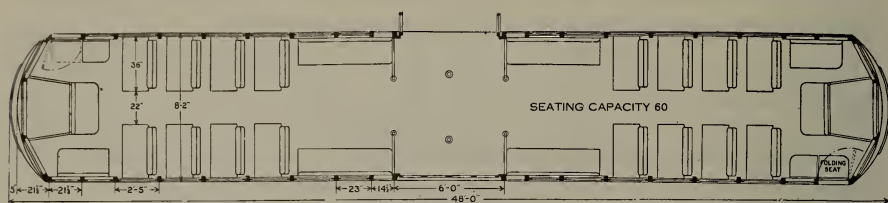
plate formed into a channel over the center door by the addition of another angle; and by using wide plates on each side and over the door and I-beam center stringers, ample strength is secured to prevent deflection at the center. The bottom framing construction permits of a built-up truss being placed across the underframe 3 ft. 6 in. back of the door posts on each side of the center entrance. How the frame is tied across and diagonally braced is shown on the accompanying diagram. Both in design and construction, the cars are considered to be unusually good examples of modern steel work.

The method of ramping the floor at the center platform is clearly illustrated on this page. This ramp rises from the level part of the platform $4\frac{1}{2}$ in. above the step treads at the doors, making the risers from the platform to the car floor at each side 11 in. The ramp in the car floor extends nearly to the body bolsters, rising 11 in. in about 11 ft.

As will be seen in the diagram on page 52, the seating arrangement is well adapted to suburban service, having accommodations for 36 out of 60 seated passengers on transverse seats and with sufficient standing room near the cen-



CARS FOR WILKES-BARRE RAILWAY. The side angles are reinforced at center with I-beam center sills connected to the side construction by lateral trusses



CARS FOR WILKES-BARRE RAILWAY. Height from track to underside of side sills, at ends, 2 ft. 8 in.; at center, 11 in.; from underside of side sills over trolley boards, 8 ft. 7 1/4 in.; from floor to center of headlining at top of ramp, 7 ft. 9 in.; track to step, 15 in.; ramp of platform, 4 1/4 in.; platform to floor, 7 1/4 in.; weight of trucks, including wheels and axles, 15,300 lb.; weight of motors, 9,540 lb.; total weight, 49,100 lb.

ter to prevent crowding. A stanchion separates incoming and outgoing passengers, and the two-leaf double folding doors on each side are opened simultaneously by a lever on a standard, two standards being provided and the space

between serving as the conductor's position. Swing doors at diagonally opposite corners are for the motorman's use only, except in case of emergency. The side windows are capable of being raised their full height, and the upper sashes are stationary; the end windows have stationary lower sashes, and the upper sashes slide down on the outside. Dull-finished cherry is employed for the interior woodwork, and Brill "Winner" seats and other specialties of the builder's manufacture are included.

These are the first cars employing the prepayment method of fare collection to be used in Wilkes-Barre. They are in service on a line extending from the Public Square in the center of the city and through a number of small towns in the most populous residential district of



CARS FOR WILKES-BARRE RAILWAY. Center platform has ramp at both sides and the main floors are ramped from center platform to bolsters



CARS FOR WILKES-BARRE RAILWAY. The cars are for fast suburban service and mounted on Brill 27-M.C.B.2X Trucks having 6 ft. wheel base

the neighborhood. The Public Square is close to one of the railway stations and is at the center of the business district. At the Pub-

lic Square the track is near the sidewalk at one side of the street, while in the street approaching the Square it is necessary to load



CARS FOR WILKES-BARRE RAILWAY. Conductor's position is between the two door-operating standards on center platform. These are the first prepayment cars to be used in Wilkes-Barre

from the other side of the car, and as the loading and discharging of passengers in the city is mostly at the Square or nearby, the doors on each side are alternately used, which explains the entrance and exit features of the central platform. The position of the conductor enables him to turn entering passengers one way or the other

and fill his car rapidly and without confusion; and at the terminals, while the passengers are leaving and entering, the motor-man is able to get out by the corner door, change his trolley pole, come to the forward end, and take his place without interfering with the passengers. The cars are mounted on Brill 27-M.C.B.2X Trucks.

35 STEEL CARS FOR DALLAS CONSOLIDATED SYSTEM

39-E SINGLE-MOTOR TRUCKS

THE American Car Company has lately delivered 35 cars of an interesting type to the Dallas Consolidated Electric Street Railway Company, Dallas, Texas, one of the systems managed by the Stone & Webster Management Association. The design is similar, as far as the body is concerned, to the cars used on the Seattle and Tacoma lines, under the same management, but differs distinctly in

the platform arrangements. The Seattle type was shown in BRILL MAGAZINE of June, 1913, and the Tacoma type in the November, 1914, issue.

The bottom framing is of the steel side girder type with 30 by 5/32-in. plates, reinforced at the top by flat bar and at the bottom by angle. The crossings consist of 3-in. 5½-lb. I-beams with lateral truss rods under the crossings next



CARS FOR DALLAS CONSOLIDATED SYSTEM. The upper sashes are framed at bottom with a continuous rail making them integral with the letter panel. Brill 39-E Single-Motor Trucks with Graduated Spring System

to the motor traps. Angle diagonals are placed at the center and crossings are gusseted to the side angles with 3/16-in. plates. Cast steel bolsters, 8½ in. deep at the center and reinforced with a heavy rib under each end, are spaced 19 ft. 2 in. apart from center to center.

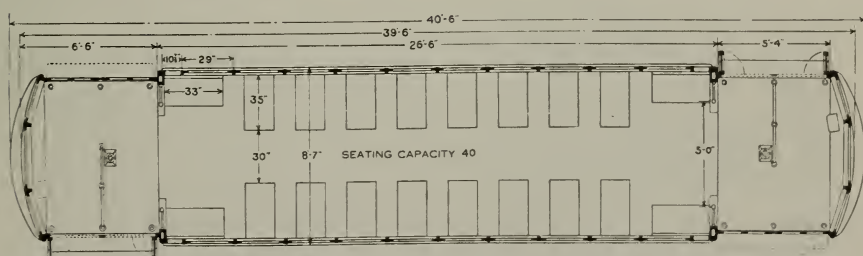
The outer platform knees are composed of 3 by 2½ by 7/16-in. angles and reinforced with smaller angles to form a channel at the stirrup irons. They have oak fillers, and the center platform knees are of oak with a diagonal steel bracing connected with the outside knees for taking the strains on the draft pin plates. The floor of the body is without ramp, and the flooring is of 13/16-in. boards with the usual depression at the aisle for the maple strips. A one-



CARS FOR DALLAS CONSOLIDATED SYSTEM. Conductor's position is between the platform railing and the end sill. Doors and step operate in unison

inch maple flooring is laid on the platforms.

T-posts of 2 by 1½ by ¼ section are placed at 29-in. centers, with double corner posts spaced at



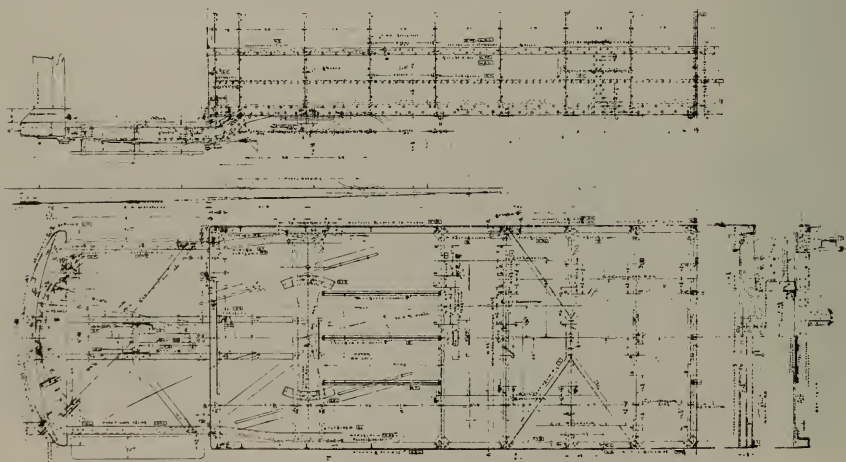
CARS FOR DALLAS CONSOLIDATED SYSTEM. Height from track to underside of side sills, 2 ft. 8½ in.; from underside to side sills over trolley boards, 8 ft. 10½ in.; from floor to center of ceiling, 8 ft. 0½ in.; track to step, 15 in.; step to platform, 13 in.; platform to floor, 11 in.

10 $\frac{7}{8}$ -in. centers. These T-posts are continued from side to side in a single piece, and support the plain arch roof, which is made up of $\frac{1}{4}$ -in. agasote covered with 16-oz. canvas. Ceilings are omitted except as a backing for the advertising space, and, in place of the usual bulkheads, a substantial oak framing with pipe stanchions is employed. All post fillers, floor fillers, end sills and end sill fillers, door posts, vestibule posts, platform fillers, etc., are of white oak, and the doors, sashes and interior finish are of solid mahogany.

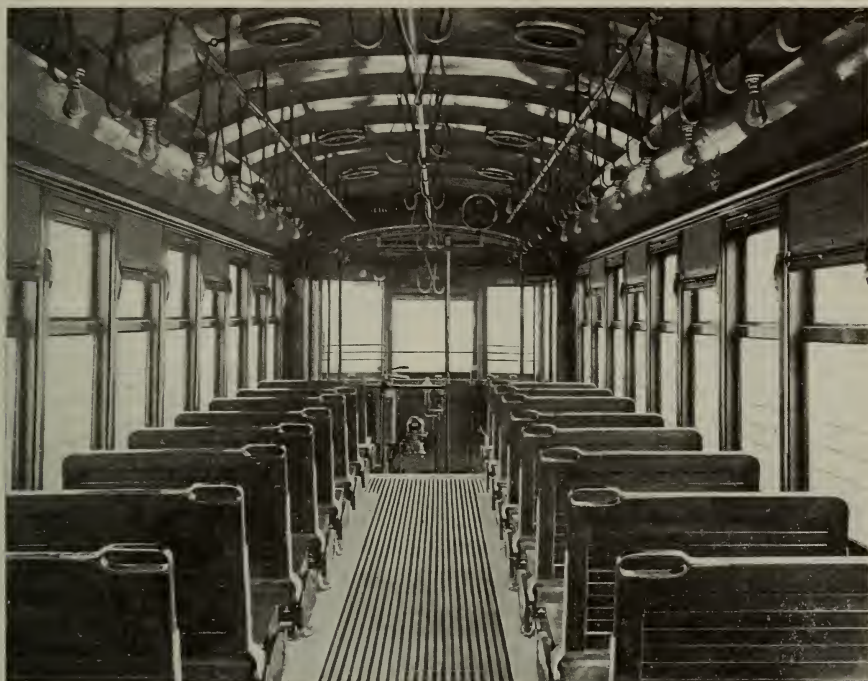
An interesting feature of the cars is the use of a continuous 1-in. rail at the bottom of the upper sashes, making the sashes form a part of the letter panel. The lower sashes are arranged to raise 25 in. in the clear. Five-bar window guards on each side of the carbody are made of $\frac{1}{4}$ -in. pipe and are attached in three sections. Over each hood there is a Stone &

Webster standard ventilator, and eight exhaust ventilators are placed in pairs along the center of the body roof. All inside trimmings, including sash locks, are of oxidized solid bronze, and push buttons are located on each window post out of the reach of children.

The diagram of the seating and platform plans shows the entrance and exit doors to be the same on both sides of the platforms. These doors are of the two-leaf outward folding type, and are hung on ball bearing galvanized pipe hinges, arranged so that they can be operated by the conductor or motorman without leaving their positions. They have rubber cushions on the edges and close against rubber cushions on the center vestibule post. The upper parts of the doors are glazed in the usual manner and the lower parts are fitted with clear wire glass. Steps arranged to work automatically



CARS FOR DALLAS CONSOLIDATED SYSTEM. The side girders are of $\frac{3}{2}$ -in. steel; I-beam crossings, angle diagonals and T-posts



CARS FOR DALLAS CONSOLIDATED SYSTEM. The upper sashes are stationary and lower sashes raise their full height

with the doors, are also hung on ball bearing steel hinges, and have $1\frac{1}{4}$ by 10-in. oak treads. All of the cars are mounted on Brill trucks of the 39-E single-motor type, having the Brill Graduated Spring System, which insures smooth riding under light loads.

All Brill pivotal trucks for city and suburban service now have the Brill Graduated Spring System as a standard part of their equipment. Old trucks of the 27-F and 27-G types, as well as those of the 39-E type built prior to the adoption of this feature, can be readily fitted with the Brill Graduated Spring System. A recently issued folder tells how.

BRILL SEMI-CONVERTIBLE CARS FOR THE BANGOR RAILWAY & ELECTRIC COMPANY

BRILL 27-M.C.B.1 TRUCKS

AMONG the recent shipments of the Wason Manufacturing Company were a number of cars of the Brill Semi-Convertible type, mounted on Brill high-speed trucks for fast suburban service on the lines of the Bangor Railway & Electric Company, of Bangor, Maine. This railway system is one of the oldest in the country, and has been a user of Brill Semi-Convertible cars for many years. Bangor is one of the most important tourist centers in the State, and during the summer the cars on the lines that run out of the city are largely used by sight-seers visiting interesting points in the neighborhood. On Saturdays, Sundays and holidays, crowds are carried to the amusement park owned by the company, at Hampden, on the Penobscot River.

The winters in this part of the

country are severe, and call for the equipment of storm sashes, which can be seen in the illustration of the interior of the car. In summer, with these sashes removed, high window guards are substituted and the semi-convertible windows raised entirely into the roof pockets; the large window openings give the effect of an entirely open car from the interior, and in every respect these cars have always been popular with the traveling public.

The cars are built on a steel underframe made up of side sills 18 by 5/16 in., reinforced at the top with 3 5/8-in. flat bar, and at the bottom by 2 1/2 by 2 1/2 by 1/2-in. angle on the outside, forming a support for a light wooden sill into which the side posts are tenoned and strap bolted through the angle; they are also secured to



SEMI-CONVERTIBLE CARS FOR BANGOR. The cars are for fast suburban service and mounted on Brill 27-M.C.B.1 Trucks

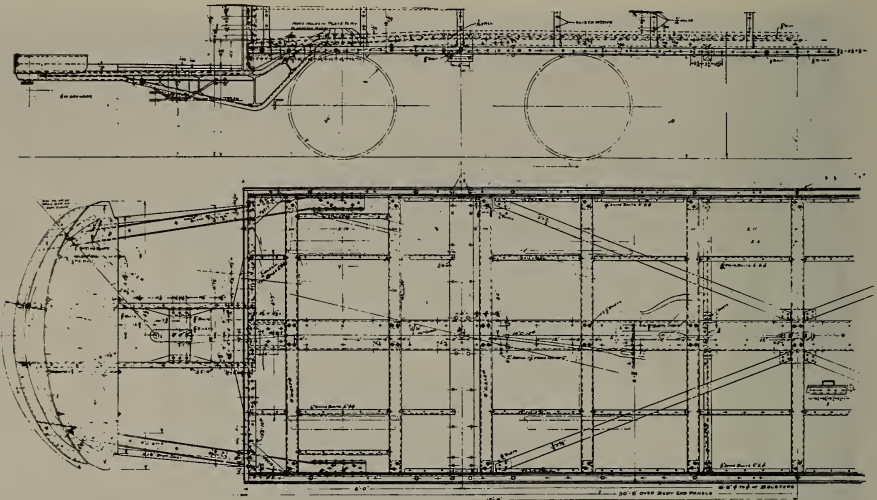


SEMI-CONVERTIBLE CARS FOR BANGOR. High window guards are substituted in summer for the storm sashes shown in the engraving

the sill plate. Angles are riveted to the ends of the sill plates and screwed to the outer of the double corner posts. Ten-inch channels are employed for the end sills, and a center stringer is also composed of a 10-in. channel with the legs down; 4-in. I-beam crossings are depressed at the center to come under the center stringer, to which they are attached with angles. Resistance to cornerwise strains is furnished by long diagonal members made of 3 by $\frac{3}{8}$ -in. flat bar. Open truss outer knees support the 5-ft. 6-in. platforms; the draft plates are attached to a pair of 3-in. channels, and a wide reinforcing plate is provided for the

center of the end sills for protection against coupling strains.

The semi-convertible window sashes are of the tandem type, joined together with a continuous hinge, and have metal sash stiles. Brill "Winner" seats with 36-in. cushions, and corner seats accommodating four passengers each, furnish a seating capacity of 44. Besides the grab handles, on the seat backs, sanitary covered handstraps are furnished for the full length of the car. Brill "Exhaust" ventilators have bronze registers, and the trimmings throughout are of the same material. Cherry is utilized for the interior wood work, sashes and doors.



SEMI-CONVERTIBLE CARS FOR BANGOR. Length of body, 30 ft. 8 in.; platforms, 5 ft. 6 in.; center of side posts, 2 ft. 8 in.; width over sills, 8 ft. 1½ in.; width over posts, 8 ft. 4¾ in.; extreme width, 8 ft. 7¾ in.; width of aisle, 2 ft. 0 in.; height from track to underside of side sills, 2 ft. 10 in.; underside of side sills over trolley boards, 9 ft. 0¾ in.; floor to center of headlining, 7 ft. 11½ in.; track to step, 15½ in.; step to platform, 14½ in.; platform to floor, 8¾ in.; weight of body, less electrical equipment, 19,650 lb.

Among other Brill specialties with which the cars are equipped are vertical brake wheels, "Dedenda" gongs, motormen's seats, sand

boxes, track scrapers, and the cars are mounted on Brill 27-M. C. B. 1 trucks having a wheel-base of 6 ft. 6 in. and 34-in. diameter wheels.

STEEL FREIGHT MOTOR CAR

GRAND RAPIDS, HOLLAND & CHICAGO RAILWAY

THE car shown in the accompanying illustrations was lately delivered on its own wheels to the Grand Rapids, Holland & Chicago Railway by The J. G. Brill Company. The car is built in an unusually substantial manner from designs furnished by the railway company, and is intended to supplement the equipment for handling the heavier freight business of the system. The lines extend from Grand Rapids in a southwesterly direction through

Zeeland and Holland to Saugatuck on the shore of Lake Michigan, where freight steamers ply directly to Chicago. The 81 miles of double-track, mostly on private right-of-way, traverse a fruit-growing district, and the cities of Grand Rapids and Holland, with their diversified manufactures, but principally using lumber in the construction of their products, furnish a profitable freight and express business both for through-hauling and between stations.

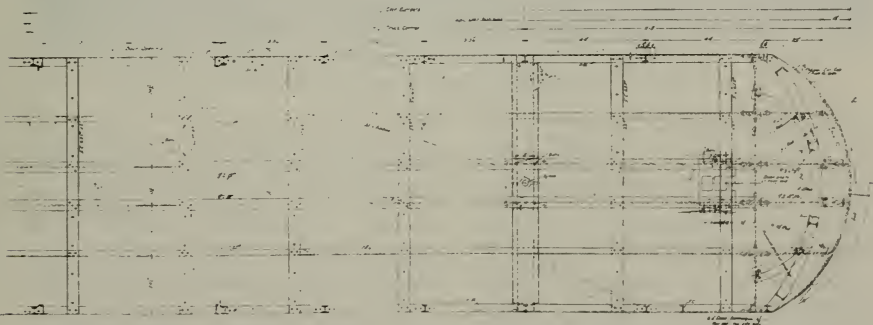


STEEL FREIGHT MOTOR CAR. Construction is entirely of steel excepting roof and floor. Six-foot door opening at each side

The diagram of the bottomframe shows a construction similar to steam car practice, in that the load is carried on the center and intermediate sills as well as by the side construction. Side sills of 7 by 3½ in. 15-lb. angles, with intermediate sills of 7-in. 12¼-lb. channels and center sills of 7-in. 15-lb. I-beams, are connected across with 5-in. 6¼-lb. channels, with flanges up, and 7-in. 14¾-lb. channels at the commencement of the curve of the bumpers at each end. Needle beams of 8-in. 18-lb. section, spaced 8 ft. from center to center, are riveted to the flanges of all longi-

tudinal members and have 16-in. queen posts for the main truss rods, which are 1½ in. in diameter. The body bolsters are of the built-up box section type having 12 by ¾-in. top and bottom plates, ¼-in. side plates and 2½ by 2½-in. 5-lb. angles. They are riveted to the lower flanges of all longitudinal members.

An unusual feature of the upper construction is the continuous side post and carlines, made of 3-in. 5½-lb. I-beam riveted to the side sills by double angle plates. Two sliding steel doors which enclose the 6-ft. openings, one on each side



STEEL FREIGHT MOTOR CAR. Height from track to underside of side sills, 3 ft. 7 in.; underside of side sills over trolley boards, 9 ft. 9½ in.; floor to rafters, 9 ft 3½ in.

at the center of the car, are heavily framed and braced with steel angles, and the door openings are framed with 4-in. 6½-lb. channels. A 28-in. steel door is provided at the center of one end, and another of the same dimensions is at the right-hand side of the other end. The outside sheath-

inside and out for extra strength.

The floor is composed of 1¾-in. yellow pine secured to nailing pieces bolted to the cross braces. Agasote of ¼-in. thickness is employed for the roofing, and is fastened to the I-beam carlines with countersunk head stove bolts and covered with No. 8 canvas.



STEEL FREIGHT MOTOR CAR. The side posts are continued across to form carlines and are made of 3-in. I-beams

ing consists of 3/32-in. steel plates extending in one sheet from bottom of side sills to top of letter board and overlapping on the side posts, to which they are secured by a double set of rivets. A letter panel of 8 by 1/8-in. steel is welded at the joints, and similar plates are brought around the vestibule, both

The metal grab handles at the side doors and step ladder near the opposite corners on each side conform to the Interstate Commerce Commission rules. M. C. B. steel radial drawbars are provided, and Hedley anti-climbers of 16½-lb. section are mounted on 7-in. 12½-lb. channel bumpers.

EVENTS OF THE FIRST HALF CENTURY OF STREET RAILWAYS

THE first 6 or 8 horse car lines were built 1850-55, and 30 between 1855-60.
The first open summer car was built by John Stephenson in 1862.

The first bob-tail car was introduced in New Orleans by J. B. Slosson in 1868.

The first cable street railway was installed in San Francisco by Andrew C. Hallidie in 1873.

The first monitor-deck street cars were built by The J. G. Brill Company in 1873.

The first electric railway operated by a stationary dynamo was installed at the Berlin Exposition by Werner von Siemens in 1879.

The first commercial electric railway was built by Siemens & Halske at Lichterfelde, near Berlin, in 1881, and had one and one-half miles of track and one motor car.

The first convention of the American Street Railway Association was held at Young's Hotel, Boston, December 12 and 13, 1882.

The first President of American Street Railway Association was Hardin H. Littell, of Louisville, Ky.

Among the principal inventors who developed the electric railway motor through its experimental stages were Thomas A. Edison, Werner von Siemens, Charles J. Van Depoele, Leo Daft, Stephen D. Field, John C. Henry, Edward M. Bentley, Walter H. Knight, Sydney H. Short and Frank J. Sprague.

The first commercial trolley line in America was installed at the Toronto Exposition by Charles J. Van Depoele in 1884.

The first street railway truck with an independent frame for carrying the propelling mechanism, an invention of John A. Brill, was built by The J. G. Brill Company in 1885.

Among the earliest electric railways in the United States were those at Appleton, Wis., and Detroit, Mich., opened in 1886; and at Los Angeles, Cal., Port Huron, Mich., East Detroit, Mich., Lima, Ohio, Mansfield, Ohio, and Asbury Park, N. J., opened in 1887.

The first commercial electric railway on a large scale was installed at Richmond, Va., by Frank J. Sprague, in 1888. Thirty Brill cars and trucks were operated.

During the five-year period, 1888-1892, street railway trackage grew from 7,100 to 12,187 miles, and the number of cars from about 20,000 to 41,027.

The first "maximum-traction" trucks were built by The J. G. Brill Company in January, 1891. This truck was invented by John A. Brill.

The first solid forged side frames for trucks were made by The J. G. Brill Company early in 1892.

The first practical application of the three-phase system of power transmission, which made interurban railways possible, was in 1894.

The first semi-convertible car with roof pockets for double sashes was built for the Washington, Alexandria & Mt. Vernon Railway by The J. G. Brill Company in 1900. This window system was invented by John A. Brill.

BRILL MAGAZINE

ELECTRIC RAILWAY EMPLOYEES' MAGAZINES

The following magazines are published monthly and distributed among the employes of the companies:

Company	Name of Publication	Circulation	Size	Pages	Commenced
Portland Ry., Lt. & Power Co.	Portland Carman		6¾x9¾	40 & cover	June, 1908
The Denver Tramway Co.	The Tramway Bulletin	1,550	6¾x10	32-48 & cover	Oct., 1909
Puget Sound Tr., Lt. & Pwr. Co.	Puget Sound Elec. Journal	1,500	6x 9	32 & cover	Jan., 1910
Interborough Rapid Transit Co.	Interborough Bulletin	18,500	9x12	16	Jan., 1911
The Milwaukee Elec. Ry. & Lt. Co.	Rail and Wire	4,000	6x 9	32 & cover	June, 1913
The United R. R. of San Francisco.	The United Railroads Magazine	3,500	6¾x10	8	Mar., 1914
New York Rlys. Co.	New York Railways Employes' Magazine	8,500	9x12	16	Apr., 1914
Detroit United Rwy.	Safety	6,000	4½x7½	16 & cover	May, 1914
The Louisville Railway Co.	Trolley Topics		6x8½	16	Nov., 1914
Mahoning & Shenago Ry. & Lt. Co.	Em-an-Ess Electric News	2,000	6x9	24 & cover	Dec., 1914
Southern Public Utilities Co.	Southern Public Utilities Co. Magazine		6x9	28 & cover	Feb., 1915

NOTE.—If the electric railway companies publishing employes' magazines, not listed above, will please send copies to the editor of BRILL MAGAZINE, a supplementary list will be published.

BRILL PUBLICATIONS

CARS

CATALOG NO.

City and Interurban Cars .	207
Storage Battery Cars . . .	203
Snow Sweepers and Plows .	183
Centrifugal Sprinkling Cars	182
Steam Railway Cars and Trucks (Wason) . . .	

Six-Wheel No. 27-M. C. B.

Truck 191

SUPPLIES AND SPECIALTIES

Order Guide for Car Parts and Specialties. . . .	201
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CHANGES OF ADDRESS

THOSE who receive BRILL MAGAZINE are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.



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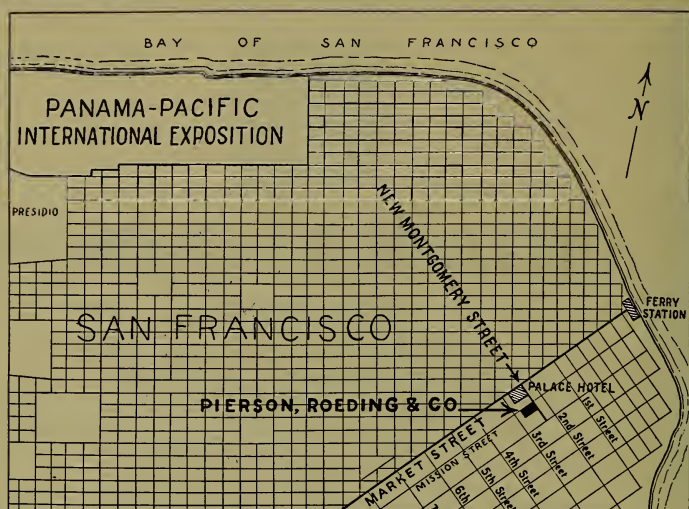
BELGIUM AND HOLLAND—C. Dubbelman, 48
Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—Shackleford &
Co., Calle San Martin 201, Buenos Aires

NATAL, TRANSVAAL AND ORANGE RIVER
COLONY—Thomas Barlow & Sons, Durban, Natal

CHINA—Shewan, Tomes & Co., Hong Kong, Can-
ton, Shanghai

ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan



THIS map of the northeastern section of San Francisco shows the location of the Exposition Grounds in relation to the business district along Market Street. The well-known and conspicuous Market Street landmark, the Palace Hotel, is in the heart of the busiest part of the city and is at the corner of New Montgomery Street, where but a block east will be found the main offices of our Pacific Coast Agents, Messrs. Pierson, Roeding & Company. The offices are on the ground floor of the Rialto Building, 118-130 New Montgomery Street—corner of Mission Street. All Railway Officials from abroad and from all parts of this country who will attend the Exposition during the year, are cordially invited to visit the offices and are requested to ask for Mr. H. R. Noack, President, Mr. Thomas Finigan, Vice-President, and Mr. F. A. Richards, Manager Car Dept.

THE J. G. BRILL COMPANY, PHILADELPHIA

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Terminal Building & Station
Indianapolis, Ind.



THE BRILL "RADIAX" TRUCK

THE long links in the Brill "Radiax" Truck permit a considerable radial movement of the axles without the links assuming an excessive inclination. The two pins at the lower end engage in grooves. The instant a movement of the links occurs, one or the other comes out of engagement with its groove, thereby setting up a powerful tendency to return to normal position. This arrangement holds the carbody steady on straight track and permits free radiation on curves. Being a Brill truck, naturally the "Radiax" has solid-forged side frames.

THE J. G. BRILL COMPANY, PHILADELPHIA



T. H. Tutwiler

PRESIDENT AND GENERAL MANAGER, MEMPHIS STREET RAILWAY COMPANY

The following is from the "Employes' Bulletin," issued by the Memphis Street Railway Company:

*"The company is, in a large measure, judged by the impression which you, its representatives, make upon the public by the manner in which you handle passengers, particularly children and old persons. Let it be said that the street railway employes of Memphis are the most courteous of any in the country. ¶ It is our wish that you make and maintain such a reputation so that all may have a good word for our railway system and its men. ¶ This is the day of opportunities. Opportunities make men. Let caution be your watchword! Be always alert and alive to the duties resting upon you. Look ahead and think ahead. Train your mind so that you may be able to grasp a situation when it arises. Don't wait until something happens before realizing what you should have done. In doing this you will not only have the consciousness of feeling that you may have been the means of avoiding an accident, but you will also realize that you are training yourself for future responsibilities. * * * ¶ Observe the conditions which surround you, as with your experience you are in a position to foresee the carelessness of others and by a word or act prevent injury. Watch for your opportunity!"*

MARCH 15, 1915

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THOMAS H. TUTWILER

THOMAS H. TUTWILER, President and General Manager of the Memphis Street Railway Company, was born September 22, 1866, at Palmyra, Virginia. At the age of sixteen he joined an engineering corps of the Richmond & Allegheny R. R. (now the Chesapeake & Ohio R. R.) as rodman. After the completion of this work he was for several years engaged in the same capacity on engineer corps, surveying and constructing the Georgia, Pacific R. R. (now a part of the Southern Railway system) from Atlanta, Ga., to Greenville, Miss. In 1886 he became assistant engineer of surveys and construction, and in 1889 was appointed resident engineer in the construction of the Sunflower River bridge, in Mississippi. He was next engaged as division engineer by the Louisville, New Orleans & Texas R. R. (now a part of the Illinois Central System), in charge of surveys and construction of branch lines in Mississippi. The town of Tutwiler, Miss., was named in his honor. He entered the street railway field in 1892 as assistant engineer, and later chief engineer, of the New Orleans Traction Company, in charge of construction and maintenance, tracks and overhead lines, and remained in New Orleans till 1901. During his connection with the transportation system of the city all of the horse and steam lines were electrified and many new electric lines were built. In 1901 he became connected with the engineering firm of Ford, Bacon & Davis, and during the years 1901 to 1905 was engaged in important construction and rehabilitation street railway work in Birmingham, Ala., Kansas City, Mo., and Nashville, Tenn. In 1905 he was elected Vice-President and General Manager, and later in the same year, President and General Manager, of the Memphis Street Railway Company. Mr. Tutwiler takes great interest in details of construction, operation and maintenance. He is an advocate of publicity in public service affairs, and has pursued a liberal and expansive policy, which has resulted in the company gaining steadily in public favor. He is a member of the American Society of Civil Engineers and of the American Electric Railway Association.

INTERURBAN CENTERS AND INTERURBAN CARS

INDIANAPOLIS

THE State of Indiana lies at the center of the great level and fertile area between the Great Lakes and the Ohio River. It is unusually well served with steam railways, which form a veritable network of tracks in every part of the State, and is traversed by nearly all of the transcontinental trunk line systems and by important north and south lines. The climate is equable, with a mean annual temperature of about 52 degrees Fahrenheit and a mean annual rainfall of about 43 inches. Agriculture is the chief industry, over 90 per cent. of the area being included in farms, of which nearly all the land is improved. The State ranks among the first in corn and wheat production, and stock raising is one of its most important industries. Immense development of the natural gas region in the east central part of the State, and the production of petroleum and coal, together with unusual shipping facilities, have made it rank high in the value, extent and producing power of its manufacturing industries. The fact that the most important manufacturing centers—Indianapolis, Terre Haute, Evansville, South Bend, Fort Wayne, Anderson, Hammond, Richmond, Muncie, Michigan City and Elwood—are in different parts of the State, instead of being confined to certain sections, has had much to do with the development of the vast scheme

of interurban railway systems throughout the State.

While the history of interurban traction only reaches back twenty years, and while many systems were in operation in other parts of the country when the first interurban car entered Indianapolis on January 1, 1900, the city quickly became the first interurban center of the world in mileage of track, and holds that precedence today. One reason for the rapid expansion of heavy traction systems centering at Indianapolis is apparent from the large number of manufacturing towns and cities and the unusual density of the rural population within the surrounding territory. Specifically, there are 174 cities and towns in Indiana which are tributary to the interurban lines converging at the metropolis, and these have a combined population of over 1,000,000; the 18 cities and towns of the neighboring States which have either direct or connecting interurban facilities with the Indianapolis terminals aggregate nearly another 1,000,000. Of these 192 cities and towns, 4 have a population of over 100,000; 3 have between 50,000 and 100,000; 23 have between 10,000 and 50,000; 27 have between 5,000 and 10,000; 48 have between 1,000 and 5,000, and 87 have less than 1,000. It is difficult to estimate the rural population of the districts which intervene between these cities and

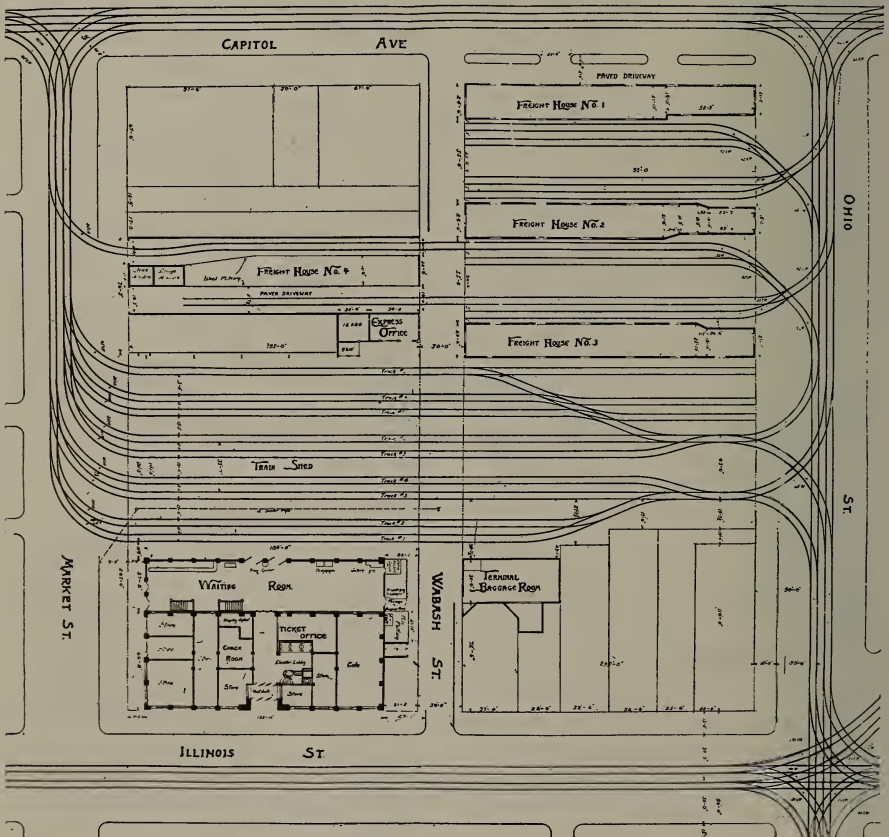


towns, but as there is no waste land and all is occupied by farms devoted to agriculture and stock raising, the figure must be large. Another reason is found in the nature of the region, which affords every physical advantage for railway construction, as it consists entirely of undulating prairie land, with no large rivers or large lakes.

Indianapolis is not only the capital and centrally located city of

the State, but is also the largest in population, and holds the chief place financially, commercially and politically. Few State capitals are the largest cities, or are the financial and commercial centers of large regions. The city also enjoys the distinction of having the only passenger and freight terminals used by all the interurban lines.

The first line to commence oper-



INTERURBAN CENTERS AND CARS. The Indianapolis Traction & Terminal Company's station is at the business center and is within one block of the central city railway loop, from which the city cars radiate in all directions.



INTERURBAN CENTERS AND CARS. Passenger and freight station of the Indianapolis Traction & Terminal Company. The four interurban systems centering at Indianapolis use the passenger and freight stations conjointly. The passenger tracks accommodate 75 passenger cars at one time.



INTERURBAN CENTERS AND CARS. Anderson Power Station of the Union Traction Company of Indiana.

ation was the Indianapolis, Columbus & Southern Traction to Greenwood, 10 miles south of Indianapolis, January 1, 1900, and was followed a few months later by the Eastern Division of the Terre Haute, Indianapolis & Eastern to Greenfield, 21 miles. Thereafter,

and up to 1911, new lines were opened at the rate of one a year, so that at present there are 12 distinct heavy traction lines radiating in all directions. These lines are grouped into four interurban systems having a combined trackage of 1,080 miles—the Union Traction Com-

pany of Indiana, 420 miles; Terre Haute, Indianapolis & Eastern Traction, 425 miles; Indianapolis & Cincinnati Traction, 118 miles, and the Interstate Public Service, 117 miles. Five other systems over which through service is operated are the Fort Wayne & Northern Indiana Traction, with 220 miles of trackage; Winona Interurban Railway, 76 miles; Chicago, South



INTERURBAN CENTERS AND CARS. Interlocking signal station on Union Traction line north of Carmel at crossing of steam railroad.



INTERURBAN CENTERS AND CARS. White River bridge at Broad Ripple on the Union Traction System.

Bend & Northern Indiana Railway, 120 miles; Southern Michigan Railway, 37 miles, and Ohio Electric Railway, 670 miles. These raise the mileage of track to 2,203, and if the connecting railways of other parts of the State and of Ohio and Michigan are included, the enormous aggregate of approximately 4,000 is totaled.

Other interesting figures which show the phenomenal expansion of the lines directly connected with Indianapolis are the passenger traffic statistics of each year. Beginning with 1900, the totals were 377,-761, 955,554, 1,523,-411, 2,347,936, 3,274,-654, 3,881,332, 4,469,-982, 5,032,677, 4,979,-371, 5,156,906, 5,736,-

272, 6,431,714, 6,524,366, 7,012,763.

The four interurban railways which enter Indianapolis have the use of the power and tracks within the city, and the passenger and freight terminals under franchises and agreements with the city and with the Indianapolis Traction &



INTERURBAN CENTERS AND CARS. A cut on the Union Traction lines north of Broad Ripple.



INTERURBAN CENTERS AND CARS. Standard combination car of the Union Traction Company of Indiana. Length over vestibules, 61 ft. 5 in.

Terminal Company, which owns the terminal property and operates the city system, comprising 140 miles of track. The passenger and freight terminals cover the larger part of a square of about four acres in extent at the center of the city, and were opened for business on September 4, 1904. Facilities are provided in the passenger trackage of the terminal for 85 pas-

senger cars at the same time, and there are frequent occasions when the entire trackage is used.

For the year 1914, the number of interurban and suburban passenger cars arriving and departing at the terminal totaled 259,806, an average of 712 per day. The smallest number for any month was in February — 17,315; the largest number was in July—24,896. The

number of freight cars arriving and departing for the same year was 25,488, an average of 70 per day. Combining the totals of passenger and freight cars gives an aggregate of 285,294 for the year, a daily average of 782.

Through limited trains are operated between Indianapolis and the following cities; the table also gives time between terminals.



INTERURBAN CENTERS AND CARS. Interior of above car. Seating capacity, 56



INTERURBAN CENTERS AND CARS. Freight car of the Union Traction system equipped for single-end operation.

	Miles	Time	Trains Daily Each Way
Ft. Wayne ..	136	4 hrs. 55 min.	10
Goshen	160	5 hrs. 27 min.	2
Louisville ...	117	4 hrs.	6
Terre Haute..	72	2 hrs. 25 min.	7
Marion	72	2 hrs. 40 min.	2
LaFayette ...	70	2 hrs. 10 min.	5
Richmond ...	70	2 hrs. 35 min.	7
Muncie	57	1 hr. 50 min.	10
Connersville .	58	1 hr. 55 min.	4
Greensburg ..	49	1 hr. 45 min.	6

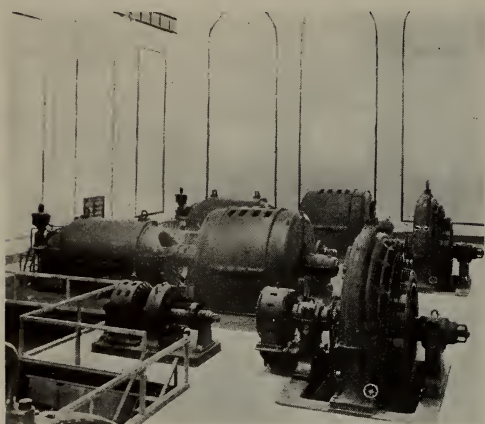
operation; four motors of 75 to 100 horse-power capacity each are used per car. The maximum speed is 60 miles per hour, and the average number of stops is about 1 1-3 per mile.

The illustrations which accompany this article are typical of all of the lines of the region, and not

All the interurban lines running out of Indianapolis are mostly on private right-of-way outside of cities, highways being used as a rule for short distances only. The cars are run both single and in trains of two, and occasionally three cars, and are equipped with multiple-unit control on all lines except one. All the lines are equipped for trolley



INTERURBAN CENTERS AND CARS. End view of car shown above. Full-width end doors enable the car to handle automobiles and bulky freight.



Indianapolis power station of the T. H. I. & E. Traction Company on White River in Indianapolis.

Power station and car barn on the Northwestern Division of the T. H. I. & E. at Lebanon.

merely of the particular systems which they represent, as the district served by each system presents the same operating conditions as the others. The rails are chiefly of 72 and 80-lb. section, laid largely on oak ties, with stone ballast. All lines on private right-of-way are fenced and furnished with suitable means at roadway crossings for preventing cattle from straying on the railway property. As nearly all of the land is level, long stretches of straight track are common to all of the systems. The curves outside of cities are generally of large radii, and grades are few and low. Large portions of some of the lines are equipped with block signals, and interlockers at steam railway crossings. Highway signals and other safety devices follow the most modern practice. The several types of bridges illustrated indicate the substantial character of this part of line construction. Concrete is largely used in both larger and smaller bridge construction and for the culverts over the many small water courses which abound in all parts of the State.



INTERURBAN CENTERS AND CARS. Joint passenger, freight and sub-station at Plainfield on the Brazil Division of the T. H. I. & E.

Much attention has been given to the provision of adequate passenger and freight station facilities in the cities and principal towns, and to the construction of attractive way stations at frequent intervals along the routes. Railway parks at favorable locations in relation to length of runs from populous centers have been developed and provided with attractions for stimulating excursion traffic during the summer season.



INTERURBAN CENTERS AND CARS. Joint passenger and sub-station at Greencastle on the Brazil Division of the T. H. I. & E.

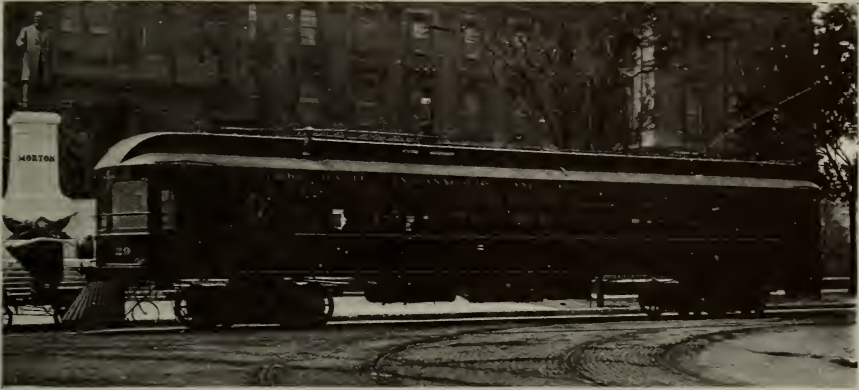


Steel bridge south of Lafayette.
Antioch, a farmers' settlement, four miles south of Frankfort.



Concrete bridge at Plainfield.
Typical track scene on the Northwestern Division.

VIEWS ON THE TERRE HAUTE, INDIANAPOLIS & EASTERN LINES



INTERURBAN CENTERS AND CARS. Combination passenger and baggage car of the T. H. I. & E. system. Length over vestibules, 60 ft. 2 in. Seating capacity, 56

A large part of the car equipment of these systems is of the three-compartment type illustrated. These are about 60 feet long, have seating capacity in the main compartment for 36, and for 20 in the smoking section. The use of a baggage compartment was long ago demonstrated to be necessary for the encouragement of traffic which would otherwise go to the steam roads. Older types of cars had but

two compartments, the baggage section, with its folding seats, being used by smokers. When the lines became longer and baggage compartment facilities for smokers became too limited and uncomfortable, long cars with commodious smoking compartments were adopted, and after the first few years became the prevailing type of rolling stock. Practically all of the cars are of wooden construction



INTERURBAN CENTERS AND CARS. Another type of combination passenger and baggage car of the T. H. I. & E. system.



INTERURBAN CENTERS AND CARS. Standard type of freight car of the T. H. I. & E. lines.

built on composite underframes, and have attractive interiors, with high-back seats, parcel racks, toilet

rooms, large windows and excellent lighting and ventilating arrangements.

STEEL CARS FOR SPRINGFIELD, OHIO

BRILL SINGLE-MOTOR TRUCKS

THE Springfield Railway Company, of Springfield, Ohio, has added to its rolling stock 10 steel cars of the type illustrated, built by The J. G. Brill Company, and mounted on Brill 39-E Single-motor Trucks, with the new graduated spring system. These cars have the pay-within method of fare collection, which has been found well adapted to the characteristics of the Springfield lines. Prepayment methods have been in use on the city system for three years, and the present platform plan, including the entrance-exit features, are the result of careful experimentation to secure that which is best suited to local requirements.

The new cars have been divided between three divisions; four were placed on the six-mile Limestone Division, two on the 7½-mile Center Street Division, and four on the 8½-mile Belmont and Snyder Park Division. The traffic on the latter division is heavy during the summer season on account of the attractions of the magnificent city park, which lies but a few miles west of the center of Springfield, and upon which the municipality has expended large sums in beautifying and improving.

While the new cars do not differ radically from former equipment, there are a number of interesting features, to which attention is di-

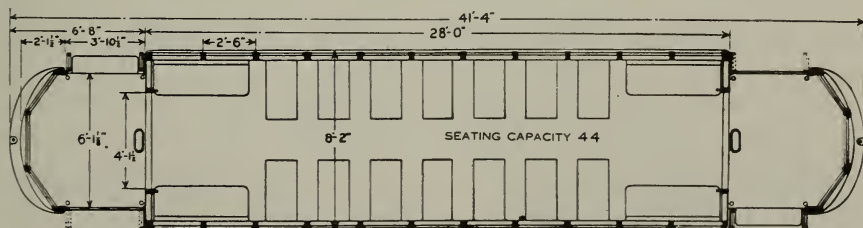


STEEL CARS FOR SPRINGFIELD, OHIO. The doors at both sides of the platforms are the same, except that those at diagonal corners are operated at conductor's position, while the others are controlled by handles in front of the motorman. All ten cars are mounted on Brill 59-E Trucks.

rected. The framing construction consists of girder sides of 3-16-in. plate reinforced at the top with flat bar, and double-riveted at the bottom to angle sills. These plates are 29 inches high, and in one piece from corner post to corner post; they are connected with the end plates, which are bent around the corner posts and brought to the bulkhead posts. End sills of deep channel section are reinforced at their connection with the side sills with extra wide $\frac{3}{8}$ -in. gusset plates. As the load is entirely borne by the side construction, the crossings are

of light channels. Cast-steel bolsters are made with extended ribs, to which the ends of the four platform channel knees are riveted. Long diagonal crossings at the center of the underframe aid to preserve the squareness of the entire structure.

Continuous tee posts comprise the main members of the upper structure, including the corner posts. Tees are also used at the center of the vestibule, while angles are used for the vestibule door jambs and bulkhead posts. Furring blocks are fitted to the tee car-



STEEL CARS FOR SPRINGFIELD, OHIO. From track to under side of side sills, 2 ft. 8 $\frac{1}{2}$ in.; underside of sills over trolley boards, 8 ft. 8 $\frac{1}{2}$ in.; floor to center head-lining, 7 ft. 10 $\frac{1}{2}$ in.; track to step, 16 in.; step to platform, 13 $\frac{1}{2}$ in.; platform to floor, 9 in.; wheel base of trucks, 4 ft. 10 in.; diameter of wheels, 34 and 22 in.; total weight, 37,020 lb.

lines for attaching the tongue-and-grooved roof boards. As will be seen in the illustration of the exterior of the car, the curvatures of the body roof and the hoods differ to provide space for automatic bulkhead ventilators. Sheathing

posts. They are provided with No. 14 gauge steel battens to give the appearance of independent sash. The lower sashes are arranged to raise their full height, and the window openings are protected by five-bar window guards in three sec-

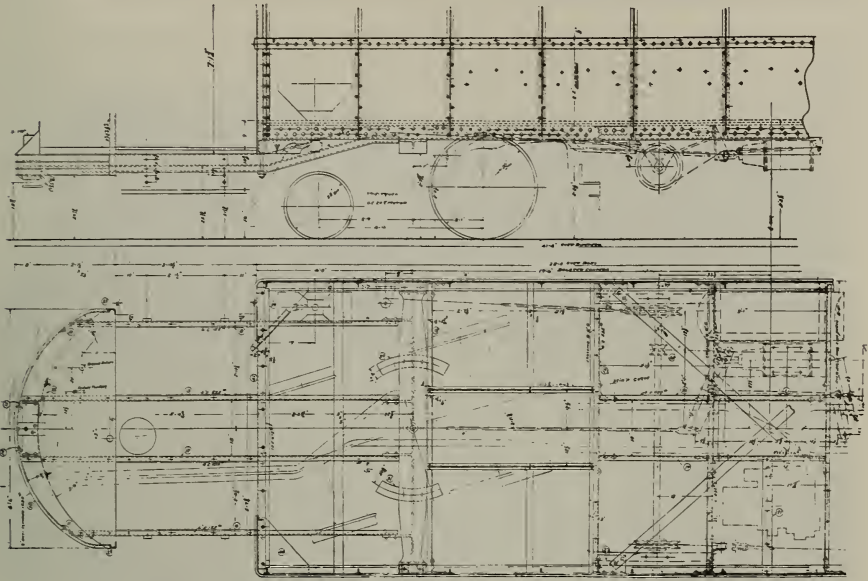


STEEL CARS FOR SPRINGFIELD, OHIO. Mahogany is used for the interior finish, with cork insulated sides below the window rails. Brill "Winner" seats are of mahogany slat construction.

of the vestibules is of No. 10 sheet steel in three pieces; buffer shields of No. 12 sheet steel, also in three sections, are brought to the top of the bumper facing, which consists of Hedley Anti-climbers brought completely around the front.

The upper window sashes are stationary, framed in a continuous piece from corner post to corner post, and securely bolted to the tee

tions to each side of the car. Mahogany of plain, sanitary design constitutes the interior finish above the window rail. Below the windows and between the posts is a 1-in. thick cork lining, with canvas glued to the finished side and painted to match the interior finish. Sheet steel, painted to match the interior finish, is employed for the vestibule lining, and is set up



STEEL CARS FOR SPRINGFIELD, OHIO. The side girders are made of 3-16 in. plate, 29 in. high, reinforced at top and bottom, and as they carry all the load, light channels are used for the crossings.

two inches from the floor. Head linings of 3-16-in. agasote, divided into three panels, complete the interior construction.

Mahogany slat seats of the Brill "Winner" reversible-back type, and corner seats of the same material, are installed in all of the cars. Three drop sashes, with single lights of glass, are used in the ves-

tibules, and double, outwardly-folding, two-leaf doors are at both sides of the vestibules, and operate in conjunction with the steps.

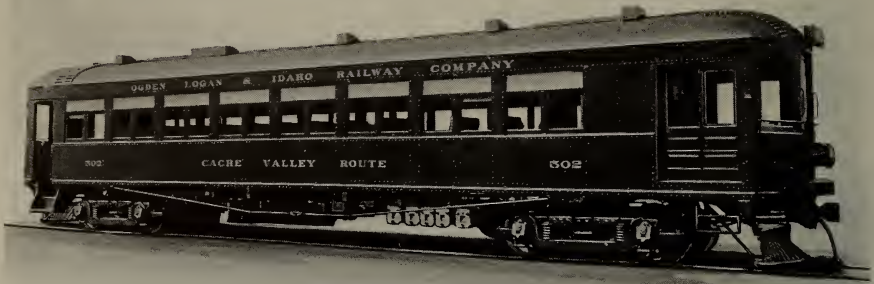
Recent improvements which have been made in connection with the Springfield Railway Company's lines are five miles of new routes, new barns, shops and a power station.

CARS FOR NEW CONSOLIDATED LINES IN SOUTHERN UTAH

STEEL COMBINATION TYPE

THE Ogden, Logan & Idaho Railway Company was organized in October, 1914, to take over the properties of the Ogden Rapid Transit Company and the

Logan Rapid Transit Company. At present the company is operating about 50 miles of interurban lines; extensions are under construction which will raise the trackage to 96

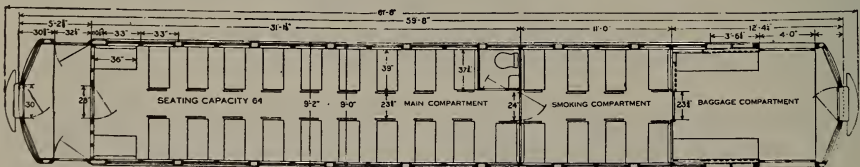


NEW CARS FOR SOUTHERN UTAH. Standard type of three compartment car adopted by the O. L. & I. system. Mounted on Brill 27-M.C.B.3X Trucks.

miles of interurban lines by the end of summer. It is reported that on completion of the work undertaken the company will have practically 135 miles of interurban track, in addition to about six miles of city lines in Logan and 40 miles in Ogden. A union station at Ogden for the use of the company and the line of the Salt Lake & Ogden Railway, which extends from Salt Lake City to Ogden, has recently been completed. The new lines will give interurban service from Preston, in Idaho, south through the towns of Smithfield, Logan, Providence and many intervening towns in the Cache Valley; from Providence in a southwesterly direction to Brigham City, thence directly south to Ogden, a distance in all of

about 65 miles. Several branch lines are also under construction to important towns in the region. All the interurban lines are being equipped with catenary overhead construction, and will be operated at 1,500 volts, direct current.

Three steel cars of the type illustrated have been delivered to the system by the American Car Company. These cars are equipped for double-end operation, multiple-unit control, and have train doors at both ends. They are mounted on Brill 27-MCB-3X trucks, with four 1,500-volt motors per car of 110 horsepower capacity each, and capable of a speed of 60 miles per hour. Fast schedules can be maintained, as the stops average one to each two miles.



NEW CARS FOR SOUTHERN UTAH. From track to underside of side sill, 3 ft. 6½ in.; side sills over trolley boards, 9 ft. 8½ in.; floor to center of headlining, 8 ft. 5½ in.; track to step, 17½ in.; risers, 11½ in.; wheel base of trucks, 7 ft. 0 in.; diameter of wheels, 36 in.

The underframing of the cars is built up of 8-in. channel side sills, 8-in. I-beam center sills, 6-in. channel crossings, 8-in. I-beam trussed needle beams, and a 6-in. channel end sill trussed and reinforced. The center sills are spaced $18\frac{1}{2}$ in. from center to center, and there

over the bolsters, and the lower trusses bear against 10-in. queen posts set under the ends of the needle beams. The bolsters are of truss form, composed of 12 by $1\frac{1}{4}$ -in. steel top and bottom plates, with channel fillers. The framing at both ends is reinforced against



NEW CARS FOR SOUTHERN UTAH. Interior of main compartment. Bulkhead between main and smoking compartment is of steel. Interior finish, mahogany.

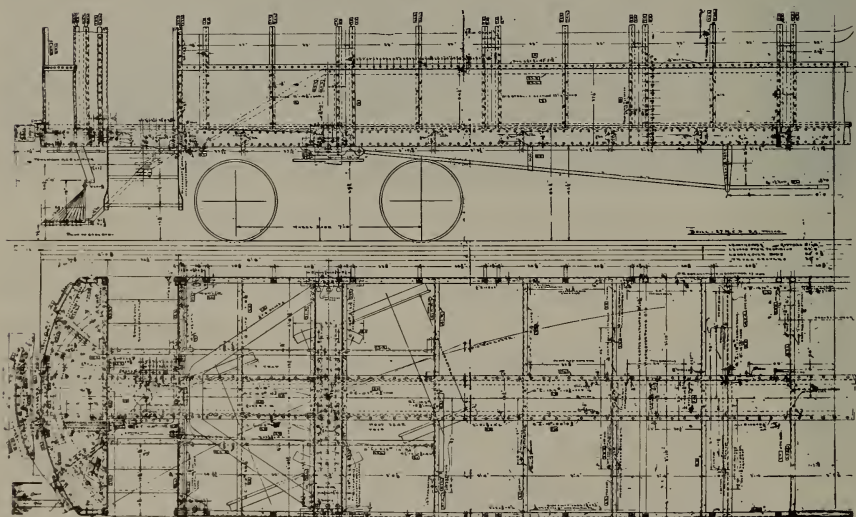
are 13 crossings, not including the needle beams; from center to center of the needle beams is 8 feet. The sides are formed into girders by using 7-64-in. steel, 37 in. wide, double riveted through the channel sills and reinforced at the top with $2\frac{1}{2}$ by $\frac{1}{2}$ -in. bar. Upper and lower trusses are employed; the upper are supported directly under the belt rail on steel struts placed

coupling shocks on the draw plates by 6 by $\frac{1}{4}$ -in. plate diagonal bracing secured to the ends of the body bolsters.

Each end of the underframe is fitted with a 25 by $\frac{1}{4}$ -in. steel plate crown piece riveted to the top of all longitudinal sills. Channel bumpers are riveted by angles to all sills and fitted on the outside with radial spring buffers composed



NEW CARS FOR SOUTHERN UTAH. Interior of baggage compartment showing compactly arranged operating devices. Platform at other end has same equipment and arranged to serve as a cab.



NEW CARS FOR SOUTHERN UTAH. The plate girder side construction has extra reinforcements of upper and lower trusses. Tees are used for the single and double side posts and angles for the roof rafters.

of steel channels and plates of proper curvature to suit track curves.

Steel is used for the entire upper framing. The double and single side posts are composed of $2\frac{1}{4}$ by $\frac{1}{4}$ -in. tees, with 3 by 2 by $\frac{1}{2}$ -in. angle corner posts. A substantial angle top plate secures the posts together and forms a base for the angle rafters which support the plain arch roof. The letter panel, the covering of the double posts and other sheathing of sides and vestibules are of $7/64$ -in. steel. Wooden carlines, 10 in. between centers, bolted to the steel rafters and set between, are used for fastening the roof sheathing of cypress and the ceiling. No. 8 canvas is employed for the roof covering, and is laid on in a single piece. The trolley boards extend full length, and roof mats protect the ends from the trolley poles in the usual way.

Tongue-and-grooved yellow pine flooring is laid in two thicknesses, with two thicknesses of water-proof building felt between; the lower floor is laid diagonally and fastened to the nailing sills bolted to the steel underframe; the top flooring is laid lengthwise. A deafening

floor is placed underneath, with a space of $1\frac{1}{2}$ in. under the double flooring packed with mineral wool. Agasote is used for the inside lining below the windows, leaving a space of $2\frac{1}{4}$ in. between the outside steel



NEW CARS FOR SOUTHERN UTAH. Cars are equipped with train doors at both ends and multiple-unit control, but will be operated singly at present

sheathing and the inside lining. Above the lower side lining, the finish and also the doors, sashes, etc., are of mahogany of natural grain, varnished and rubbed to a smooth dull finish. The agasote below the windows is painted and grained to represent mahogany;

agasote is also used for the ceiling. Pressed prism plate glass is fitted in the outside upper window sashes of the twin windows, and leaded cathedral glass in the inside, concealing the single side posts between.

Between the main and smoking compartments is a steel bulkhead, painted and grained to correspond with the interior finish, and fitted with a 24-in. glazed door and a large stationary sash on the opposite side to the toilet room, which is located in the main compartment next to the bulkhead. The partition between the baggage and smoking compartments is of solid mahogany, with a center sliding door

glazed in the upper part and furnished with a vertical roller curtain. Roomy seats, with backs 25 in. high, having head rolls, are upholstered in dark green leather, and have arm rests, including the stationary seats next the bulkhead. Parcel racks are provided for the three compartments, and, with all other metal fixtures, are of highly polished solid bronze. Lighting of the three compartments is provided by twenty-one 56-watt lamps, with shades, placed along the center of the ceiling, and 23-watt lamps are used for the signs, vestibules and toilet room. The cars are fitted with M.C.B. radial steel couplers and locomotive type of steel pilots.

MORE SEMI-CONVERTIBLE CARS FOR EASTON TRANSIT COMPANY

SINGLE- AND DOUBLE-TRUCK TYPES

A FEW weeks ago the Easton Transit Company, whose lines are part of the Lehigh Valley Transit system, received six

single-truck and one double-truck semi-convertible cars from The J. G. Brill Company. Brill semi-convertible cars have been used on the



SEMI-CONVERTIBLE CARS FOR EASTON. All-steel car, including steel roof, for high-speed service on the Bethlehem Division of the Easton Transit lines. Mounted on Brill 27-M.C.B.1 Trucks



SEMI-CONVERTIBLE CARS FOR EASTON. The windows are of the tandem-sash Brill Semi-convertible type. The corner seats occupy the space of two windows.

company's system since 1904. The 52 miles of trackage comprising the Easton Transit Company's system serves and connects the cities of Easton, Phillipsburg, Bethlehem, South Bethlehem and Nazareth, at the junction of the Delaware and Lehigh Rivers, 50 miles north of Philadelphia. Connections are also made with Philadelphia from South Bethlehem and Easton over the lines of the Lehigh Valley Transit Company.

The single-truck cars were put in operation on the local lines in Easton and Phillipsburg. The company operates 22 of the single truck cars in the winter and

25 in the summer; of the latter number, 18 open summer cars are put in service during the season. The larger car has been added to the equipment of the Bethlehem Division, operating in local service on a 11½-mile run, and on limited trips to Allentown, 17 miles. The Allentown trip requires 55 minutes and averages 22 stops; one grade of 8 per cent., and several of from 3 to 5 per cent., are encountered. The general traffic of all of the lines is heavier in the summer, and there is more through service on the lines to Philadelphia.

Both types have tandem-sash,

semi-convertible windows, and the structural details differ considerably from former types; both are built on steel underframes, and the longer car has steel upper structure. Brill 21-E trucks are largely used on the system, and carry the

side plates riveted at the bottom to the shorter leg of a 7 by 3½ by ½-in. angle, and reinforced at the top with a pressed plate. Web plate end sills are reinforced at top and bottom with angle, and secured to the side angles with gusset

plates. The 7-in. leg of the side sill angle enables the pressed crossings to be riveted thereto without employing gusset plates. Built-up bolsters of 9 by ⅝-in. top plate and 9 by ⅞-in. bottom plate are of truss form. At each end the floor is ramped 3 in. for a distance of 3 ft. 6 in. from the end sills, to reduce the rise from the platform to 10 in. Tongue-and-grooved boards of ⅞ by 3¼-in. yellow pine compose the flooring, and are secured to strips bolted to the bottom framing; they are provided with tapered floor mats, and threshold plates and dust blocks are provided to facilitate sweeping. Six-

inch channels are used for the platform knees and are securely riveted to the angle side sills and to gusset plates riveted to the end sill plates. Angle iron bumpers are faced with Hedley Anti-climbers, and the draw plates are attached to transverse angles attached to longitudinal channels.



SEMI-CONVERTIBLE CARS FOR EASTON. Doors at each side of both platforms are alike and operate in conjunction with the steps. Multiple-unit control and air-brake couplers are included in the equipment.

shorter cars of the present order. They have wide-wing journal boxes, and have truss rods, which reinforce the support of the overhang at each end. The double-truck car is mounted on Brill 27-M.C.B.1 trucks, capable of a speed of 50 miles per hour.

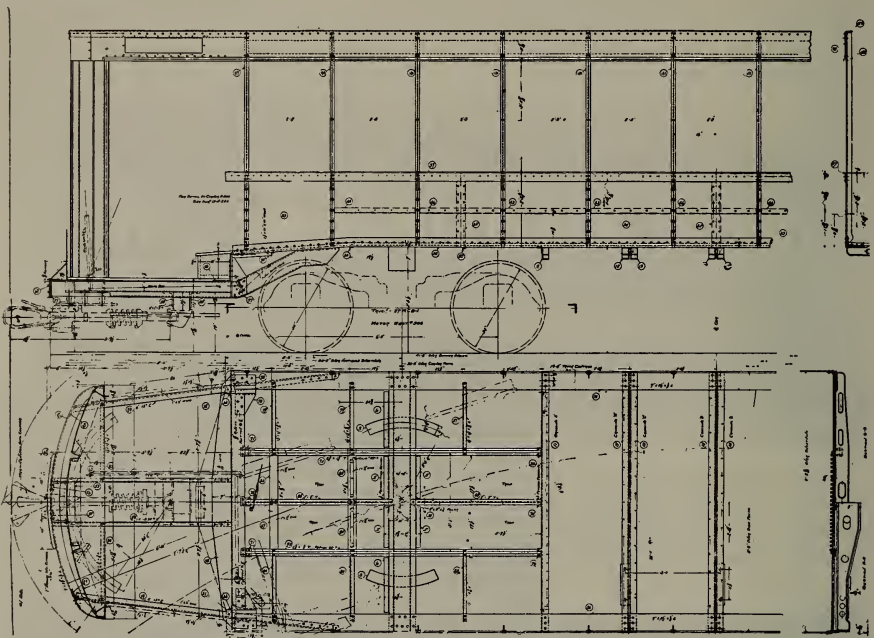
The bottom framing of the larger car is composed of 3-32-in. steel



SEMI-CONVERTIBLE CARS FOR EASTON. Length over corner posts, 20 ft. 8 in.; over platforms, 31 ft. 8 in.; centers of side posts, 2 ft. 5 in.; width over sills, 7 ft. 10½ in.; width over posts, 8 ft. 2 in.; extreme width, 8 ft. 5¼ in.; width of aisle, 22 in.; underside of side sills over trolley boards, 11 ft. 4 in.; floor to center of head-lining, 7 ft. 8 in.; wheel base of Brill 21-E Truck, 7 ft. 6 in.; diameter of wheels, 33 in.; weight of carbody, less electrical equipment, 12,420 lb.; electrical equipment, 940 lb.; truck, 5,800 lb.; motors, 4,770 lb.; total weight, 23,930 lb.



SEMI-CONVERTIBLE CARS FOR EASTON. Interior of car shown above. Brill Semi-Convertible cars have been used in Easton since 1904.



SEMI-CONVERTIBLE CARS FOR EASTON. Length over corner posts, 30 ft. 8 in.; over platforms, 40 ft. 8 in.; centers of side posts, 2 ft. 8 in. width over sides, 8 ft. 2 in.; extreme width, 8 ft. 4 $\frac{1}{4}$ in.; width of aisle, 24 in.; from track to underside of side sills, 2 ft. 8 $\frac{3}{8}$ in.; side sills over trolley boards, 12 ft. 4 in.; floor to center of headlining, 8 ft. 0 $\frac{1}{2}$ in.; track to step, 15 $\frac{3}{8}$ in.; step to platform, 14 $\frac{1}{2}$ in.; platform to floor, 9 in.; weight of body, less electrical equipment, 20,593 lb.; electrical and air equipment, 4,205 lb.; trucks, 16,180 lb.; motors, 11,140 lb.; total weight, 52,118 lb.

which are riveted to a 7 by 3-16-in. plate secured to the end sill.

Side posts of T-section are riveted to the side plates, pressed steel belt rail, wide steel letterboard panels and pressed steel angle-shape top plates. The letter board and top plates extend to the vestibule corner posts, and are riveted to a similar construction around the ends. Pressed steel rafters support the roof, which is made of sheet steel and covered with 1-in. cork-board insulation, protected with No. 8 cotton duck. The interior is finished in cherry stained to a mahogany color, and the sides below the window rail are lined with 1-in. pressed cork, cemented to the steel

panels and covered with buckram painted to match the interior wood-work.

The vestibules of both long and short cars are generally similar, and are equipped on both sides with two-leaf, outward-folding doors, one hinged to the body corner post and the other to the vestibule corner post. A pipe stanchion at the center of the door opening separates passengers entering and leaving at the rear; these doors are operated by the conductor from a control stand at the center of a hexagon extension of the end of the main floor. The doors at the motorman's right are operated by a handle in front of the motorman's

position, and are used for exit only. Single steps are provided at the door openings, and operated in conjunction with the doors.

The single-truck cars are also built with steel underframes, but have wooden upper framing. The side sills are composed of 14 by 3-16-in. steel plate reinforced at top and bottom by 2 by 2½ by ¼-in. angle. The end sills are of channel section secured to the side sills with forged brackets of generous dimensions. Channel crossings are gusseted to the side sills, and are supported on I-beam subsills, which are attached to the upper chords of the truck. Six-inch

channel outer knees, reinforced with angles, and 5-in. channel center knees support the platforms, which are 6 in. longer than the larger car. The side posts are 2¼ in. thick, and the corner posts 3⅞ in.; they have a sweep of 1¾ in. Ash is used for the side posts, and oak for the corner posts.

The interior finish is of cherry-stained mahogany, and the ceilings are of agasote, painted robin-egg blue and decorated with gold striping. "Winner" seats, both transverse and longitudinal, of the builder's manufacture, are provided for all of the cars, and are covered with twill-woven rattan.

CONVERTIBLE CARS FOR SPRINGFIELD, MASS.

PREPAYMENT TYPE

TEN cars of the type illustrated were built by the Wason Manufacturing Company and placed in service on the lines of the Springfield Street Railway

Company, of Springfield, Mass., in January, constituting the first prepayment equipment used on the system. The cars are in service on an important cross-town line with



PREPAYMENT CARS FOR SPRINGFIELD, MASS. Prepayment method of fare collection is being introduced in Springfield with these ten cars of the convertible type.

a run of approximately nine miles.

As this form of convertible car has been shown repeatedly in these pages since its introduction in 1910 by the Third Avenue Railway Company, of New York, it is unnecessary to call attention to its advantages. It will be noticed that the

unusual feature of this underframe is a Z-bar end sill, with oak filler secured to the side sills with forged corner brackets. A 10-in. channel, with legs down, forms the center stringer, and, in addition to the plate crossings, there are two main cross members, composed of

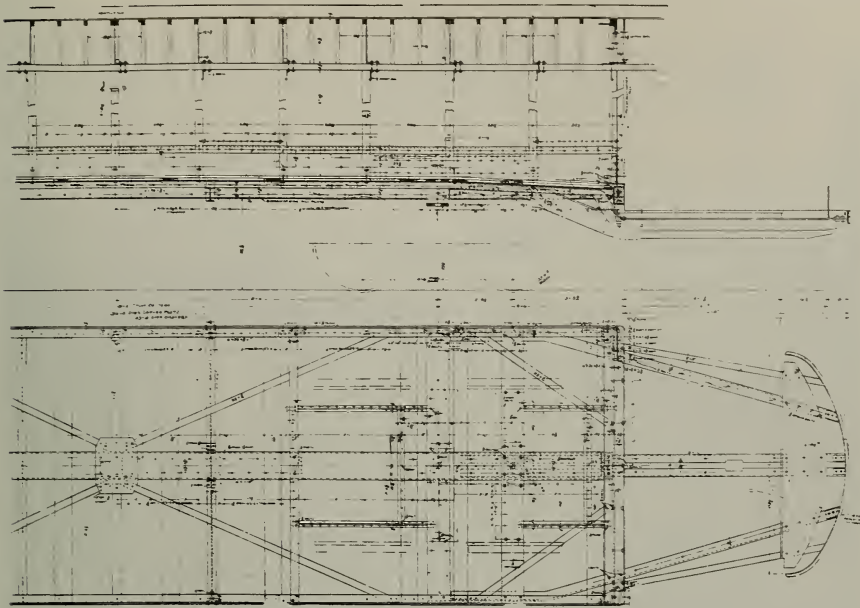


PREPAYMENT CARS FOR SPRINGFIELD, MASS. When the window panels are removed pipe guards protect the openings.

side sill plates are somewhat deeper than usual, and that the door arrangements and prepayment features are similar to those of the Springfield, Ohio, and Easton, Penna., cars shown elsewhere in this issue.

The cars are built on steel underframes made up of angle side sills with 18 by $\frac{3}{8}$ -in. steel plates, reinforced at the top with flat bar. An

I-beams, which are double brack-eted to the side sills. At the center of the structure a 20 by 15 by $\frac{3}{8}$ -in. plate, riveted on top of the center stringer, serves to attach longitudinal braces of flat bar, which extend nearly to the bolsters; transverse members of flat bar are also connected to this plate. These features and the plan of bringing the platform angles along the side



PREPAYMENT CARS FOR SPRINGFIELD, MASS. Length over corner posts, 30 ft. 0 in.; over platforms, 42 ft. 0 in.; centers of side posts, 2 ft. 5½ in.; extreme width, 8 ft. 5½ in.; width of aisle, 26½ in.; height from track to underside of side sills, 2 ft. 8½ in.; underside of side sills over trolley boards, 8 ft. 9¼ in.; floor to center of headlining, 7 ft. 8¼ in.; track to step, 15 in.; step to platform, 13 in.; platform to floor, 9 in.; seating capacity, 48; weight of body, less electrical equipment, 19,000 lb.; total weight, 46,800 lb.

sills to the bolsters will be seen in the accompanying diagram. The entire construction secures a powerful underframe and a strong support to the long platforms.

A double floor of tongue-and-grooved yellow pine is used and is ramped at the ends from the bolster to the end sill, reducing the height of the riser 2½ in. Corner posts, door posts, all intermediate posts and the vestibule posts are of white ash; the latter are double and have ½-in. rods running through the center from top of side plates to bottom of sill. The side posts are 2¾ in. thick and corner posts 4⅜ in. The roof rafters are reinforced with steel carlines at each side post.

As the bulkheads are omitted at the body ends, the corner posts are stiffened by a steel plate reinforced with angles extending from end sills to false bulkhead. Mahogany is used for the interior finish, with all trimmings made of oxidized bronze. At the corners of the car the lower sashes are arranged to raise, and the vestibule sashes are furnished with pockets in the wainscoting. The side sashes, with the exception of those at the corners, are stationary, and are framed in one piece with removable panel. When the window panels are removed, window guards, consisting of four ¼-in. pipes, protect the openings.



SAN DIEGO ELECTRIC RAILWAY COMPANY'S TERMINAL STATION AT THE PANAMA-CALIFORNIA EXPOSITION

THE International Panama-California Exposition, being held throughout this entire year at San Diego, occupies about half of Balboa Park, a 1,400-acre tract, which borders the business center of San Diego. The location of San Diego, at the southwestern corner of the United States, gives it an equable climate and is distinctly advantageous to an exposition in which agriculture, floriculture and other open-air exhibits form an important part of the vast scheme. In keeping with the early history of Southern California, the buildings are of Spanish and Mexican architecture, and contain splendid exhibits of ethnology and archeology, home economy, arts and crafts, science and education, foreign arts, commerce, industry, food products, irrigation, reforestation, reclamation, etc. The exposition is intended to especially exploit the resources, opportunities for development and possibilities for immigration, colonization and commerce of the Western States of the United States. Being the first port of entry in the United States north of the Pacific end of the Panama Canal, San Diego appropriately demonstrates to the world, through this exposition, the possibilities which exist in the vast region tributary to her as a commercial seaport as well as the avenues of commerce which may be developed with the countries north and south

on the Pacific Coast and with the Orient.

San Diego has a population of 85,000, and has 71 miles of electric railways. The terminal facilities for the railways at the Exposition, shown in the accompanying photographs, are arranged on a scale and plan which will enable the crowds to be handled quickly and without confusion or discomfort. The track is constructed of 75-lb. T-rails, and has 8 inches of crushed rock ballast under the ties. The platforms are of sufficient length to discharge and load three 2-car trains at the same time. Of the large number of cars operated on the city lines, 76 are equipped with multiple-unit control, enabling the operation of trains of two or more cars. Experience up to the present has proved that two-car trains lend themselves most conveniently to operation during peak-load periods. After leaving the cars, passengers pass down stairways into subways and ascend to the inside of the grounds, passing through exit turnstiles, which prevent them from coming back to the wrong platform. There are ten turnstiles which control the passageways from the Exposition to the car platforms. An enclosure on the leading platform has a capacity for 2,000 persons, so that in case of a blockade or any serious delay to cars, crowds can be kept under control. Large red lights over the platform exit gates

are used to enable persons at any part of the platform to know when the cars are ready for loading. The side tracks and loop track provide ample space to bunch cars in pro-

viding for an outbound crowd from the Exposition. The cost of the terminal was approximately \$20,000, inclusive of tracks and roadbed.

ELECTRIC RAILWAY MAGAZINES

IN addition to the list of railway employes' magazines published in the last issue of BRILL MAGAZINE is the following: *The H. & M. Review*, published by the Hudson and Manhattan Railroad Company, New York. This magazine was begun in December, 1914, and has a circulation of 2,000 copies. Its size is 6 by 9, and has 12 pages and cover.

Among the publications issued by electric railway companies for the benefit of the public, as well as their own employes, are *Transit*, a magazine published by the Lehigh Valley Transit Company; *The Traction Bulletin*, published weekly by the Northern Ohio Trac. & Lt. Company; and during the present month the Portland Railway & Light Company, Portland, Ore., has commenced issuing a four-page folder weekly to its patrons. A prize is being offered for a name for this publication.

Any other employes' magazines or pamphlets, leaflets, etc., not mentioned above or in the last issue of BRILL MAGAZINE, will be referred to in the April issue, if the publishers will please send copies to the editor of BRILL MAGAZINE.

BRILL PUBLICATIONS

CARS	CATALOG NO.	CATALOG NO.
City and Interurban Cars .	207	"Radiax" Truck . . . 205
Snow Sweepers and Plows	183	
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Steam Railway Cars and		Order Guide for Car Parts
Trucks (Wason) . . .		and Specialties. . . . 201
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TRUCKS		Seats and Seating Material 204
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Six-Wheel No. 27-M. C. B.		
Truck	191	Motor Omnibuses 208

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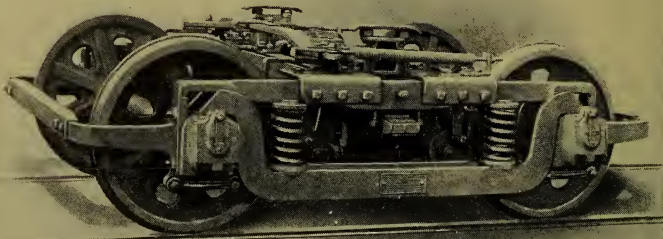
BELGIUM AND HOLLAND—C. Dubbelman, 48
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NATAL, TRANSVAAL AND ORANGE RIVER
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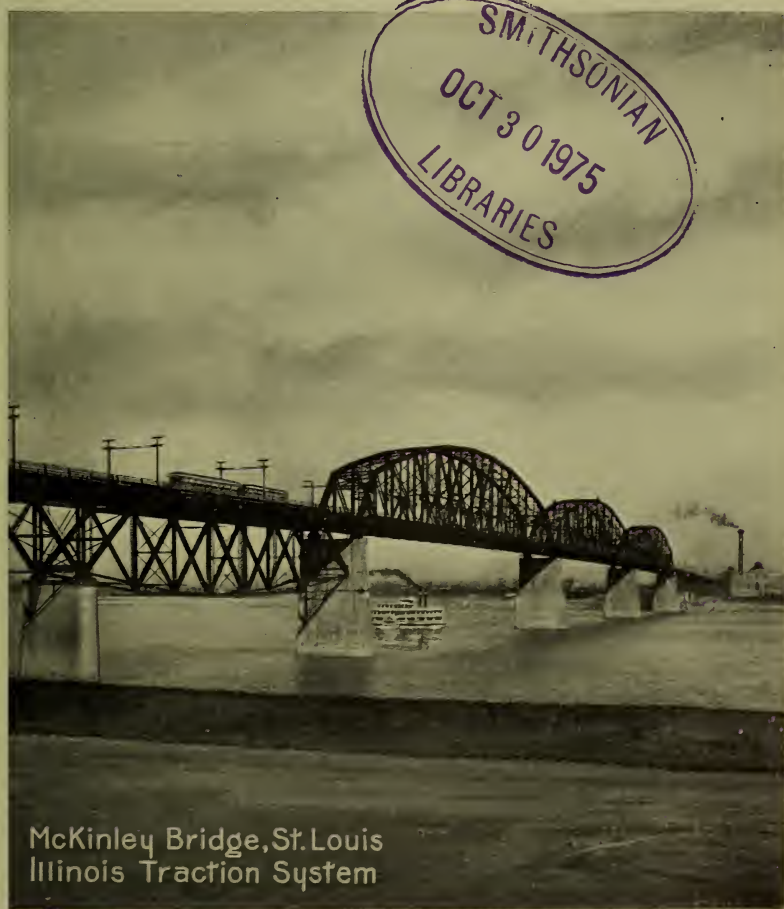


THE BRILL 27-M.C.B. TRUCK

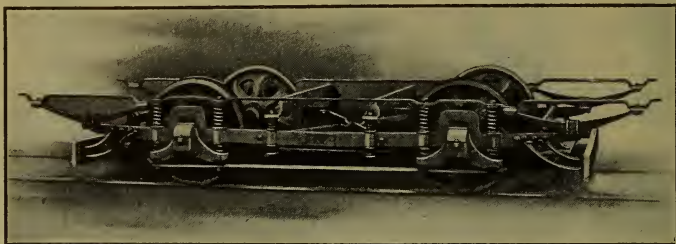
THIS is the Brill standard high-speed truck, and it is built in different sizes to suit all interurban loads and speeds. Although it has the "Master Car Builder's" system of equalization, it is distinctly a Brill product, because it has solid-forged side frames with low end frames, fold-over gusset plates, bulb angle transoms, double- and single-corner forged transom brackets, "Half-Ball" brake hangers, friction springs at the bottom of the bolster swing links, short bearings for the equalizing bars in pockets on the journal boxes, pressed steel pedestal wear plates or gibs, planed faces of the pedestals to give an accurate fit to the gibs, oil-retaining center bearings, and, in fact, every part of the truck, from center plate to boxes, bears the imprint of Brill experience, facilities and development.

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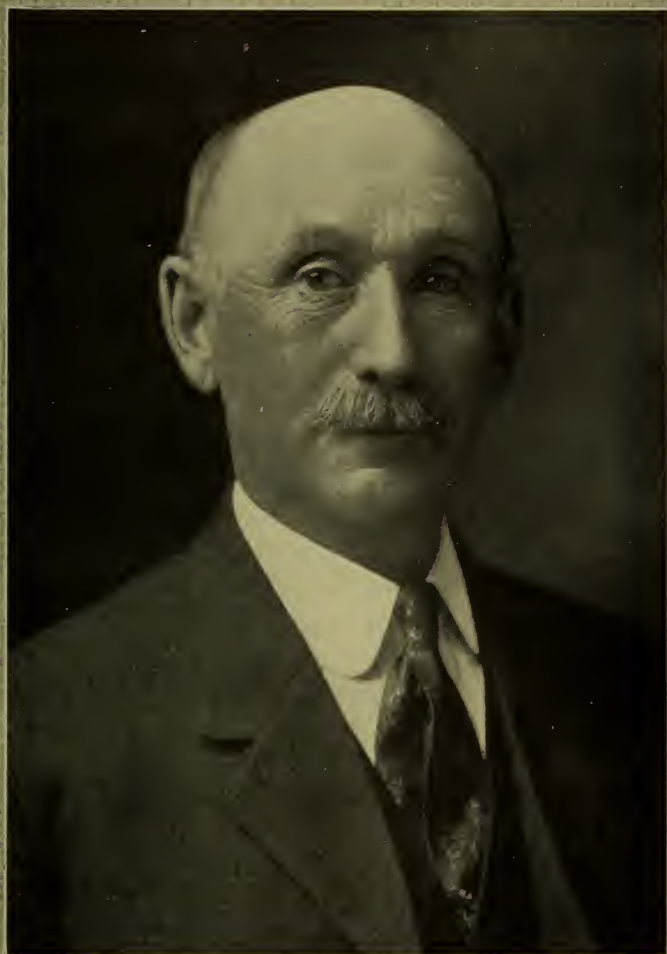


McKinley Bridge, St. Louis
Illinois Traction System



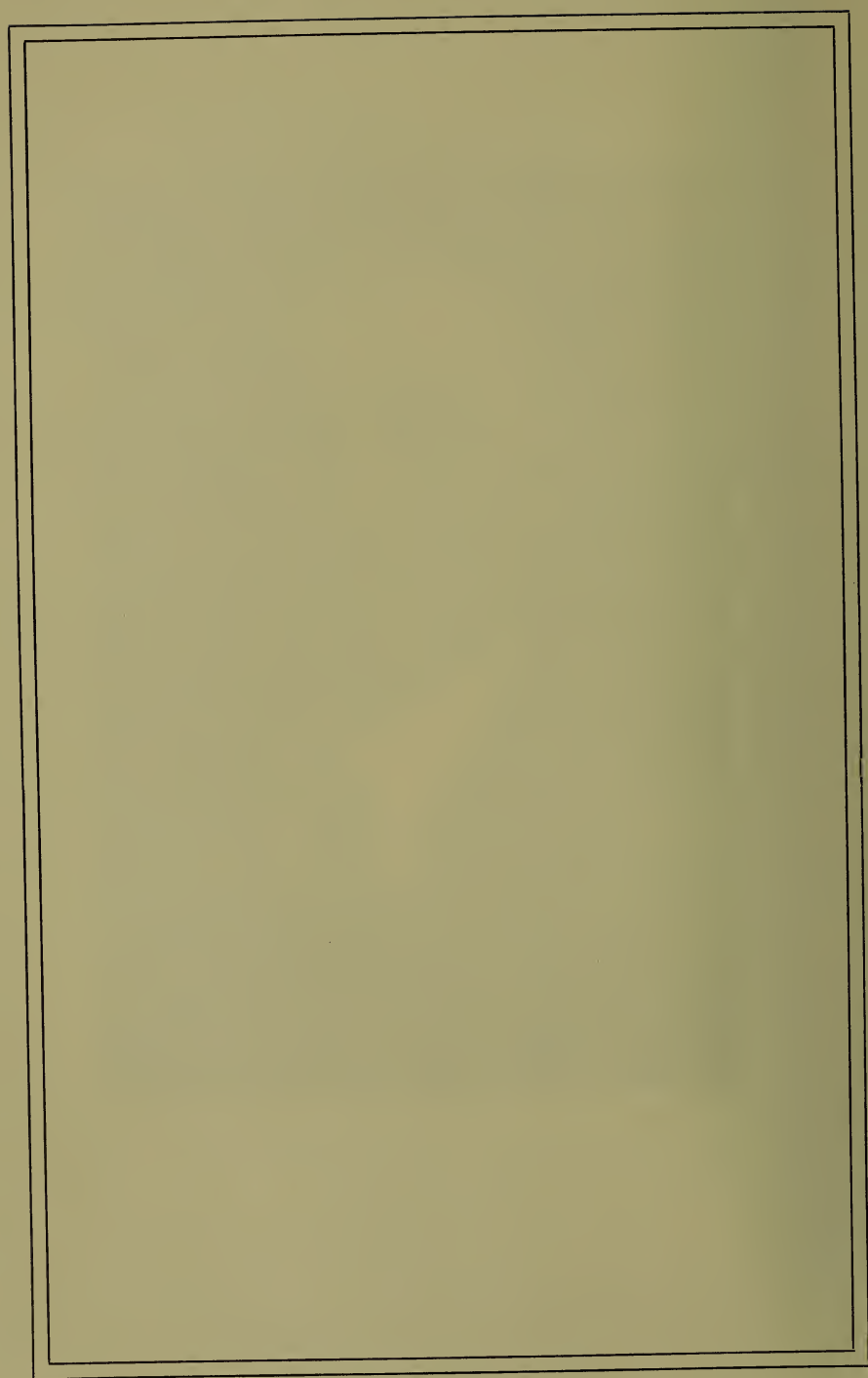
THE BRILL 21-E TRUCK

FOR over 20 years this has been the standard single-truck for cars from 18 to 23 ft. in length. The wide-wing journal boxes, shown in the illustration, have still further improved its superior riding qualities. The fact that it carries the carbody two inches lower than other single-trucks is much in its favor. Eight large-diameter coil springs, set in pairs 20 in. apart, transfer the body load to the side frames, and eight other coil springs, directly underneath, impose it on the journal boxes. The action of the semi-elliptic springs is amplified because the leverage of the truck ends is reduced below that of the former type of journal box with shorter coil spring centers. One-piece solid forged side frames insure long life, axles always in parallel, no sagging at ends, absolute dependability.



P. F. SULLIVAN

PRESIDENT, BAY STATE STREET RAILWAY COMPANY



APRIL 15, 1915

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P. F. SULLIVAN

PATRICK FRANCIS SULLIVAN, President of the Bay State Street Railway Company, was born in Cork, Ireland, March 16, 1856.

He came to America in 1873 and settled in Lowell, Mass., where he found employment with the Lowell Manufacturing Company. He attended night schools, was tutored privately, and finally took a course in mathematics and accounting at the Lowell Commercial College. In 1883 he became chief clerk to the Lowell Board of Assessors, and, after serving three years, resigned to study law. Securing a civil service appointment, he was assigned to the law division of the United States Pension Bureau, at Washington. Although offered promotion, he resigned and returned to Lowell to become associated with his brother, the publisher of the Lowell *Daily News*. About this time a committee from the Lowell Horse Railroad and the Lowell and Dracut Street Railway offered him the position of Joint Secretary, which he reluctantly accepted, but was soon interested in the then pending problem of electrification. The two roads were consolidated in 1891, and he became general manager. He went abroad to study continental railway systems, and upon his return handled his own problems with renewed confidence. In 1899 seventy-one street railway companies of Massachusetts were consolidated, and Mr. Sullivan was elected President of these large and diverse interests, which culminated in the final consolidation of the eastern Massachusetts railway interests under the title of the Bay State Street Railway Company, of which he likewise became President and director. He is also President and director of the Boston and Revere Electric Company, Newport and Fall River Electric Company; general manager Massachusetts Electric Company, director Nashua, N. H., Street Railway Company, Dorchester Mutual Fire Insurance Company, Old Colony Trust Company, Union National Bank, Lowell; director and member Executive Committee, Massachusetts Employers' Insurance Association, and trustee Central Savings Bank, Lowell. He is a member of the Algonquin, Exchange and Economic Clubs, of Boston; the Vesper, Country and Yorick Clubs, of Lowell, and the American Academy of Political and Social Science.

Courtesy of National Cyclopaedia of American Biography

INTERURBAN CENTERS AND INTERURBAN CARS

ILLINOIS TRACTION COMPANY

THE State of Illinois comprises the almost entirely level prairie land between the Mississippi River, which forms its western boundary, and Lake Michigan and the Wabash River on the east. With Chicago, the second city in population in the United States, in the northeastern corner, and St. Louis, the fourth city, just across the southwestern border, the former being the converging point of the eastern and western trunk lines, and the latter being the gateway to the great southwest territory, has caused the State to be traversed by an immense number of steam lines. The State is remarkably rich in its farm productions, and for many years has been first in the area and yield of corn. Practically the entire area consists of high improved farm lands.

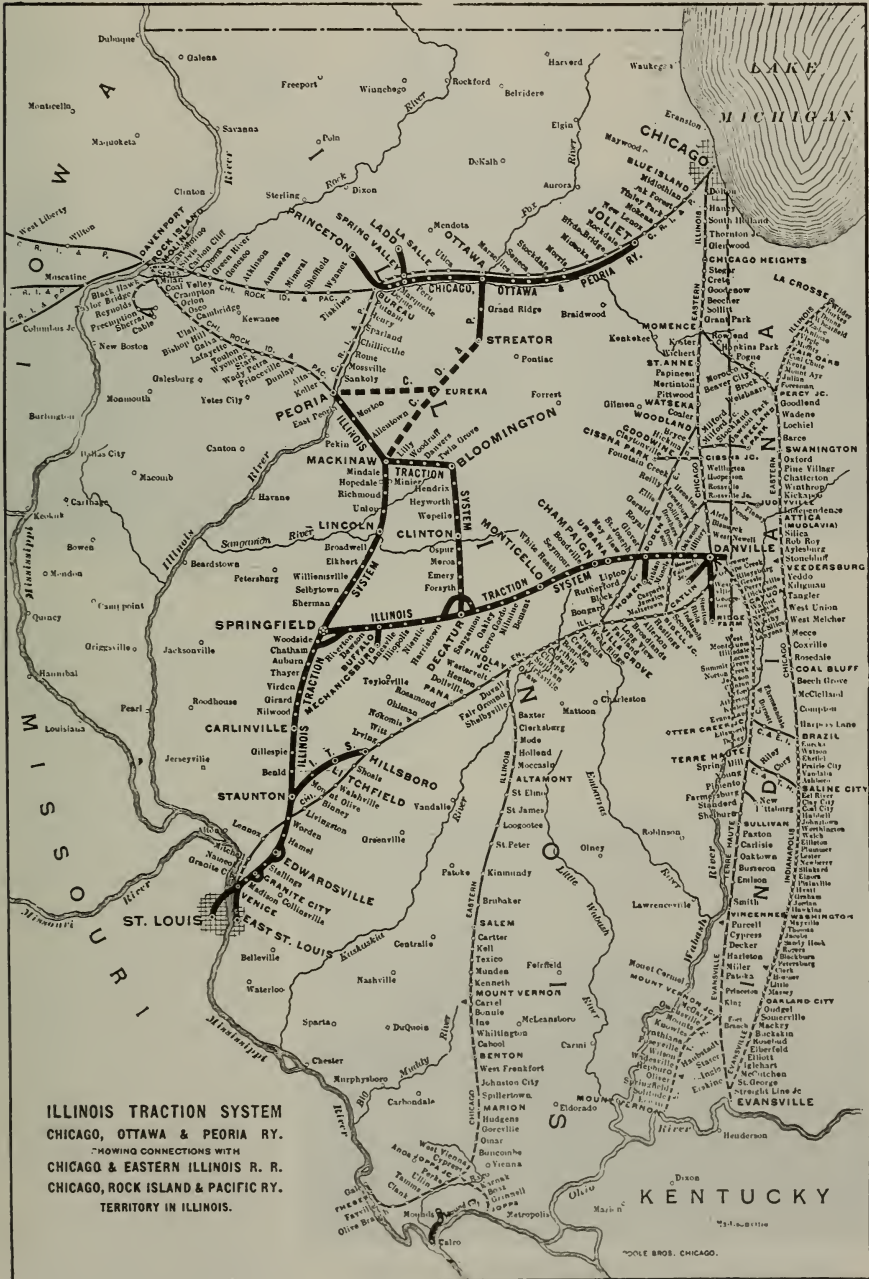
Illinois ranks second in the value of products of mining industries, no less than 37,000 square miles being underlaid with vast deposits of bituminous coal, and in the output of oil it is second among the States of the Union. It is first in the production of liquor, first in meat packing, second in the manufacture of clothing, and it ranks high in the output of its factories in many lines and in agriculture and stock raising.

The lines of the Illinois Traction System serve the populous territory and important cities lying between Chicago and St. Louis. Seven of the cities have a population of over 25,000, nine have over 5,000, and towns under that population served by the lines number 48. They aggregate a population of 1,082,909, according to the census of 1910, and, with the regions directly and more or less closely served, the tributary population of the system is estimated at 2,500,000.

Less than fifteen years ago the system had its beginning in the construction of a six-mile line from Danville south to Westville, and from that time on link after link was welded in the chain which now



ILLINOIS TRACTION SYSTEM. Station and office building at Champaign. President's offices, auditing, financial and land departments occupy the floors above the waiting rooms, ticket office, baggage and express rooms





ILLINOIS TRACTION SYSTEM. St. Louis passenger terminal, in the heart of the shopping and hotel district. Contains a commodious waiting room and is thoroughly equipped with all conveniences

connects the principal cities of the State with 550 miles of interurban track. The Main Division extends from Peoria to St. Louis, a distance of 174 miles, over which seven through passenger trains are

operated each way daily, in addition to local passenger service. From Springfield, midway on the Main Division, lines extend eastward to Danville, a distance of about 125 miles. The northern

section of the system is known as the Chicago, Ottawa & Peoria railway, and reaches from Joliet to Princeton. The accompanying map shows the various branches from the main lines and the connection which is made through to Chicago by the Chicago & Joliet Railway.

In addition to the interurban systems of railways, the Illinois Traction System



ILLINOIS TRACTION SYSTEM. Mackinaw Junction, on the Main Division, 20 miles south of Peoria. A line branches from this point, and extends through Bloomington and Clinton to Decatur, where it joins the Eastern Division



ILLINOIS TRACTION SYSTEM. Springfield passenger terminal, one of the busiest points on the system, as lines from three directions converge here. A large train shed is at the rear of the building shown

operates the city railway lines in Illinois at Bloomington, Cairo, Champaign and Urbana, Danville, Decatur, Galesburg, Jacksonville, LaSalle, Normal, Ottawa, Peoria, Peru, Princeton, Quincy, Granite City, Madison and Venice, and five city railways in other States. The company serves 92 cities and towns with electric light and power, 13 with gas, 10 with steam heat and 2 with water. The management of the system is directed from headquarters in terminal stations at convenient points on the system. A photograph is shown of the recently

completed station and office building at Champaign, where the financial and auditing departments are located. Peoria has the general executive offices of the system, which



ILLINOIS TRACTION SYSTEM. Typical shelter station. These waiting stations are placed at frequent intervals along the lines, at sidings, and at principal country road crossings

will soon be housed in a modern eight-story office and terminal building in the course of construction. The interurban operating headquarters are located at Springfield. The terminal at St. Louis, which is included among the illustrations, is a modern and commodious structure, with a large freight station adjoining. There

The passenger trains operated consist of limited and local passenger service, parlor and sleeping car service. The limited trains stop only at the larger towns and cities, and are supplemented by local trains stopping on signal at country highway crossings. Fast merchants' dispatch freight service has been highly developed, also



ILLINOIS TRACTION SYSTEM. Venice power station at the east approach of the McKinley Bridge. Present capacity, 12,000 kw.; ultimate capacity, 48,000 kw. There are four power plants with a combined total continuous capacity of 40,000 kw.

are general offices at Joliet for the Chicago, Ottawa & Peoria section of the system, which report direct to the head offices at Peoria.

Frequency of service and access to the rural districts are cardinal advantages of service along the lines of the Illinois Traction System. Trains are moved in either direction practically every hour of the day, and schedules are arranged to fit local conditions in accordance with traffic demands.

general freight service, and the transportation of heavy freight, such as shipments of corn and coal in carload lots.

Interchange arrangements exist between this electric system and many of the steam roads which furnish shippers along the lines of the Illinois Traction with an outlet for their produce to the great railway centers of the country. A typical illustration of this is found at Glover, where there is a physical

connection between the Illinois Traction system and the Chicago & Eastern Illinois Railway. A complete installation of connecting switch tracks has been made here, and equipment of all kinds may be transferred with the greatest of ease. By this connection a through service for package freight to and from Chicago is maintained.

terminal, which offers connection with the C. & A., the Rock Island and all steam roads diverging at Peoria.

Joint rates for through business have been established with the Chicago & Alton, The Wabash, the Chicago & Eastern Illinois, the Chicago, Peoria & St. Louis, Litchfield & Madison, Rock Island Southern, Missouri, Kansas &



ILLINOIS TRACTION SYSTEM. Typical joint substation and passenger station near Decatur. There are 32 substations on the system. Current is received at 55,000 volts and converted to 650 volts

Track connections have also been established with the following steam roads: The St. Louis Terminal Railway Association, at Granite City; Southern, at Venice, and through these with all steam roads at St. Louis, Mo., and East St. Louis, Ill., diversing, Wabash, at Decatur, Springfield, Mt. Olive, Staunton, Tilton; Chicago & Alton, at Selbytown and Anderson; Illinois Central, at Springfield and Decatur; the Peoria Railway Ter-

Texas, Missouri Pacific, Iron Mountain, L. & N., L. H. & St. L., and through rates covering grain have been arranged to Chicago, Detroit, Toledo, eastern seaboard, Mississippi valley and gulf points, in fact, all of the various grain markets.

The grain shipping facilities offered by this company have developed rapidly during recent years, and are becoming an important factor in the movement of



ILLINOIS TRACTION SYSTEM. St. Louis freight and express terminal. This station together with the passenger terminal shown on page 100, occupy one and one-half city blocks

crops from the big grain belt of central and southern Illinois. At present there are twenty-two elevators, ranging in capacity from 10,000 to 50,000 bushels, on the lines, and plans have been made for many more. The elevators are substantially built and equipped with modern grain handling ma-

chinery, which afford quick shipping facilities for the farmers in the territory.

There are six coal mines whose output is handled exclusively or partly by the traction system.

At the present time the Illinois Traction system has 150 miles of its lines protected with continuous

block signals. These are electric automatic continuous track circuit signals, and are being installed on other parts of the system; eventually all of the lines will be thus protected, and in the same manner as the foremost trunk line steam railways.

Entirely separate from the block signal system is the system of dispatcher's signals placed at sidings



ILLINOIS TRACTION SYSTEM. Grain elevators of the type shown and of steel tank type, are located at advantageous points on the system



ILLINOIS TRACTION SYSTEM. A coal train drawn by 62-ton locomotive having four 200 hp. motors

as an extra check on operation and as a help to the dispatcher. Curve protection signals are placed at all points of possible danger, and have a special advantage in guarding remote stretches of track. All of the lines throughout the system are connected up with the dispatcher's offices by a complete telephone arrangement, with instruments in booths at sidings as well as at substations and passenger stations.

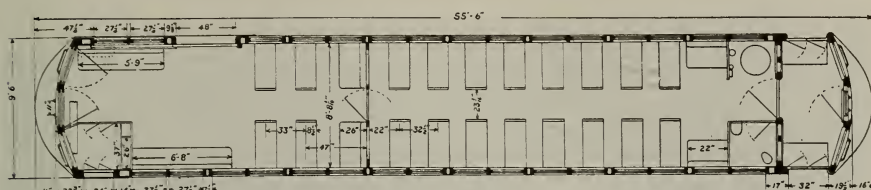
The operation of electric freight belt lines around cities in connection with interurban lines is said to have first been introduced by the Illinois Traction System, which now has belts around Edwardsville, Granite City, Springfield and Decatur, and is planning to install others. These lines avoid disturbing passenger schedules and provide traffic connections with steam railways and industrial tracks to manufacturing plants that otherwise would not be easily accessible. The Springfield belt contains the largest steel overhead viaduct on

the system. It is 2,340 feet in length, and has 48 spans on concrete piers.

The most interesting single feature of the entire system is the McKinley Bridge, shown on the front cover of this issue and named after the President and builder of the Illinois Traction System, Hon. William B. McKinley, and opened in 1911. The bridge took four years to build, and, including the land for the approaches, cost \$4,500,000. Its carrying capacity is 12,000 lb. per lineal foot. The three central spans are 523 feet, 521 feet and 521 feet long, and the shorter spans 250 feet in length. There are three short shore spans of 150 feet in length, and structural steel elevated approaches rise from grade at either side. It is 65 feet wide, and carries two railroad tracks and two roadways. The total length is $1\frac{1}{4}$ miles. The bridge crosses the Mississippi at the northern part of St. Louis, giving access to the company's passen-



ILLINOIS TRACTION SYSTEM. Standard type of passenger car of the system. The main compartment has a seating capacity of 36, and the smoking compartment 27, including 6 camp stools



ILLINOIS TRACTION SYSTEM. Compartment and seating plan of car shown on opposite page. The smoking compartment has a sliding side door and is arranged to carry a limited amount of baggage

ger and freight terminal stations in the heart of the city by way of its own lines. Besides the interurban cars which use the bridge, a heavy local service between St. Louis, Venice, Granite City and Madison is maintained with city type of cars. On the Missouri side the approach is 2,940 feet long, and passes over the 24-acre freight yards owned by the Illinois Traction System. On the opposite side of the river, and connected with the bridge tracks, is the Venice Power Plant, which supplies the southern section of the system.

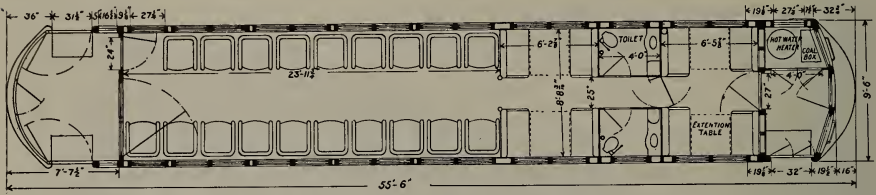
Another important bridge is at Peoria, across the Illinois River, and includes bascule lift. This bridge is of steel and concrete, and is 1,300 feet long. There is another 1,300-foot bridge, of tower and girder type, on concrete piers, across the Vermillion River at Danville. During the last two years 4,000 feet of wooden bridges were replaced with steel and concrete, in addition to rebuilding two long trestles.

The power plants are at Venice, Peoria, Riverton and Danville, and have a total continuous capacity of 40,000 kw., and are equipped with steam turbine-driven generators. The current is delivered at 32 sub-stations at 33,000 volts

and put on the lines at 650 volts.

Few roads in any part of the country have given so much attention to the development of the excursion traffic and summer pleasure travel as the Illinois Traction System. A number of parks are owned by the System, and are liberally provided with all the means for recreation and amusement.

The rolling stock of the system consists of 113 passenger cars, 35 passenger trailers, 7 parlor cars, 5 sleeping cars, 2 official cars, 19 express motor cars, 5 baggage, 2 baggage and scenery cars, 4 combination passenger and baggage cars, 103 express trailers, 4 express refrigerator cars, 29 electric locomotives, 15 cabooses, 2 cinder cars, 15 construction and work cars, 15 line and wrecking cars, 115 box cars, 332 flat-bottom coal cars, 15 hopper-bottom coal cars, 6 ballast cars, 221 gondolas, 25 side-dump cinder cars, 30 double-hopper dump cars, 5 refrigerators, and 27 flat cars. The latest type of standard passenger car measures 68 ft. 4 in. over the ends, is 9 ft. 7 in. wide, and weighs about 100,000 lb. fully equipped. The regulation passenger cars, the parlor observation cars and the sleepers are mostly constructed with underframes built up of I-beam center



ILLINOIS TRACTION SYSTEM Parlor cars are divided into general, club and smoking compartments, seating 35 persons in all. The observation platform seats 10 to 15

and intermediate sills and deep plate side sills reinforced with wooden stringers. Mahogany is used for the interior finish, and the seats are upholstered in leather. All of the cars are equipped with coupling arrangements, air brakes and safety devices which meet the requirements of the Interstate Commerce Commission, and M. C. B. interchange specifications.

Seven years ago the company placed two sleepers in operation, inaugurating what is said to be the first electric sleeping car service in the world. There are now five in

operation on the main line between St. Louis, Springfield and Peoria. They were designed by the company, and have many novel features, including windows for the upper berths, special folding berth arrangements, extra large berths and steel safety deposit boxes for valuables. Each car contains ten upper and ten lower berths, and the finish and equipment throughout are remarkably luxurious and complete. They measure 57 ft. 3 in. over the buffers. Sleeper trains are made up of a combination motor express car, a seat coach and



ILLINOIS TRACTION SYSTEM. Seven of these parlor observation cars are in service on the Main and Eastern Divisions attached to limited trains



ILLINOIS TRACTION SYSTEM. Mahogany is used for the interior finish of the regular passenger cars and sleepers, as well as of these parlor-observation car

two sleepers. The motor express cars are 52 ft. 6 in. long, are powerfully framed for locomotive service, and for 140 h. p. motors. They weigh about 100,000 lb.

In 1911 the company inaugurated its parlor observation car service, which has since been expanded till now seven large cars are in use. They are 57 ft. long, and are mounted, like the sleepers, on steel-frame, four-wheel trucks. These cars are attached to limited trains, and make two round trips a day between Peoria and St. Louis, 175 miles each way, three round trips between Springfield and St. Louis, 100 miles each way, and

two round trips between Springfield and Danville, 127 miles each way. As in the case of the sleeping cars, the parlor cars are operated as trailers and are splendidly equipped for the service. A distinguishing feature is a large rear observation platform, with ornamental brass railing, and the interiors are finished with leather-upholstered library chairs and heavily carpeted. They contain a smoking compartment, club compartment, a general compartment, with library table, and standard toilet rooms.

The freight and express equip-

Continued on page 128

SEMI-STEEL CARS FOR JACKSONVILLE, FLORIDA

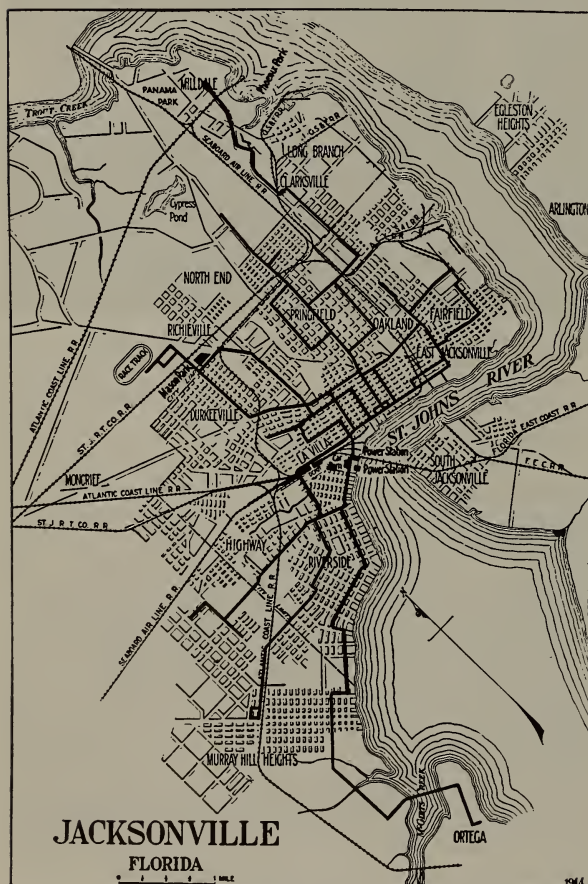
SINGLE-END PREPAYMENT TYPE

THE Jacksonville Traction Company a short time ago placed on its lines 15 new cars furnished by the American Car Company. This raises the number of motor passenger cars of the lines to 111. The new cars are being operated on different parts of the system, which com-

prises about 50 miles of track. With the exception of having gates on both sides of the rear platform, the cars are similar to others which have been in service since the latter part of 1910.

The prepayment system was inaugurated in Jacksonville in December, 1909, and the platform

arrangements have been developed since that time to secure the most suitable means of receiving and discharging passengers expeditiously according to the local traffic requirements. The mild climate makes it unnecessary to protect the rear platform or the sides of the front platform, and, therefore, high wire gates are used instead of doors. By putting the rear bulkhead one window length within the car, the length of the drop platform is materially lessened; there is an advantage in having the step from the platform to the car floor at this point because of the pause necessary in paying fares. Another advantage of the arrangement is that, in



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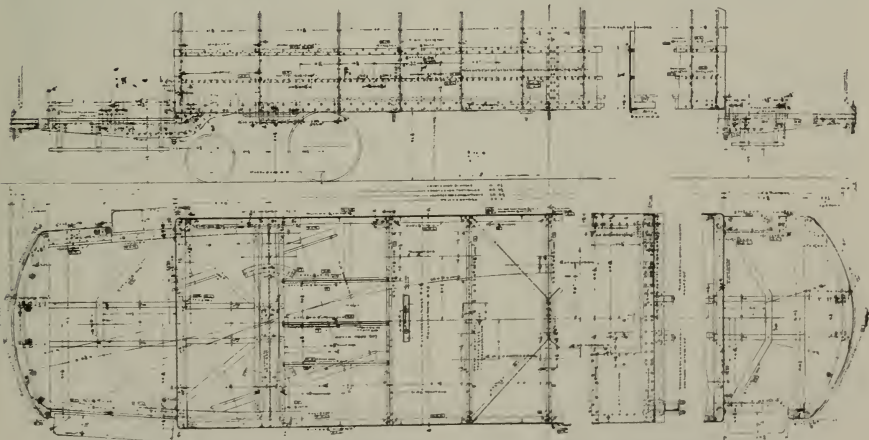


CARS FOR JACKSONVILLE. Stone & Webster type of body with light-weight steel-frame upper structure. Photographed on temporary trucks

leaving the car at the rear, space is provided for several passengers to stand close to the exit gate and ready to leave the car immediately on stopping. The reduction of weight in the overhang is an important advantage incident to the arrangement.

The framing of the cars is built largely of structural steel, with the

side posts and roof carlines of continuous $11\frac{1}{2}$ by 2 by $\frac{1}{4}$ -in. tees. The side girders are composed of 30 by 5-32-in. plate reinforced at top with flat bar and at bottom with angle; 3-in. I-beam crossings are gusseted to the angle side sills, and squareness is preserved with diagonal braces at the center and ends. Three lateral trusses give



CARS FOR JACKSONVILLE. The side girders are of $\frac{5}{16}$ -in. steel. I-beams are employed for the crossings, angles for the diagonal bracing, tees for the continuous side posts and carlines

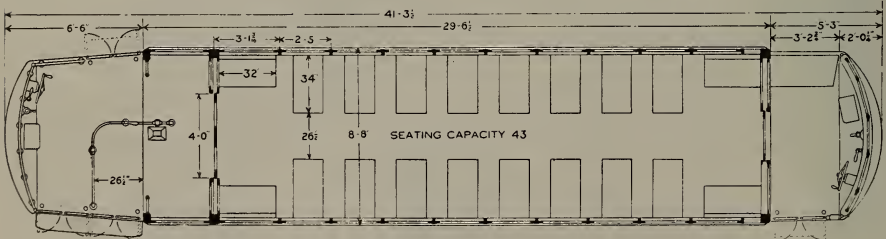


CARS FOR JACKSONVILLE. Solid mahogany interior finish. Upper sashes framed with continuous rail; lower sashes raise full height

additional support at the center of the frame and prevent any tendency to deflection due to weight of air and electrical equipment suspended underneath. Deep angle platform knees are brought back of the body bolster at the rear, and are reinforced with

lighter angles along the depressed section. Where the ends of the cast steel body bolsters pass under the side sills, substantial angle steel reinforcement is provided for the sills.

In keeping with the light construction throughout, upper side



CARS FOR JACKSONVILLE, FLA. Width over sills, 8 ft. 3-13/16 in.; width over posts, 8 ft. 3 1/2 in.; extreme width, 8 ft. 8 in.; height from track to side sills, 2 ft. 8 3/8 in.; side sills over trolley boards, 8 ft. 10 3/8 in.; floor to center of headlining, 8 ft. 0 in.; track to step, 16 1/2 in.; step to platform, 14 in.; platform to floor, 9 in.

sashes are framed in a continuous piece, thus strengthening and lightening the entire upper side structure. The roof is composed of agasote, covered with canvas, and ventilators of Stone & Webster type are placed in the ends above the connection of the detachable clam-shell hoods. Solid mahogany is used for the interior finish, including the doors and sashes, and the trimmings are of solid bronze highly polished and lacquered. The lower side sashes raise their full height, and the openings are protected by five-bar window guards made in three sections to each side. A front platform, and has a sliding portable wind shield protects the



CARS FOR JACKSONVILLE. A large prepayment platform is obtained by setting the bulkhead about 3 feet within the body of the car

center sash.

OPEN CARS FOR CORREGIDOR ISLAND, P. I.

BRILL TEN-BENCH TYPE

IN 1910 The J. G. Brill Company built a 10-bench open car for use at the United States Government Military Reservation on Corregidor Island. Three more cars of the same type have lately been shipped for service at the same place. Corregidor Island is a small island in the entrance to Manila

Bay, and used by the government for a supply station of the Coast Defense Department, in addition to other military purposes, to which its location is admirably adapted. The line is 6 miles long, 36 in. gage, and has a continuous grade in one part of $4\frac{1}{2}$ per cent. for nearly half a mile; another severe grade, and

which is the maximum, is $5\frac{1}{2}$ per cent. for 300 ft. The line voltage is 550, with a maximum of 600. There are a number of short branches from the main line used for freight purposes, gondola cars being operated with electric locomotives. A low-gear ratio is used, as the cars are not required to make more than 15 miles per hour.

The cars conform in every respect to the standard construction

sashes permit the sashes to be dropped to allow a full sweep of air through the car in warm, dry weather. The monitor deck sashes are glazed with wire glass, and the deck is reinforced in the usual manner, with concealed steel rafters $\frac{5}{8}$ in. thick, located to receive to the best advantage the strain of the trolley apparatus. Ash posts, cherry and ash slat seats, carline ceiling, finished with matched roof

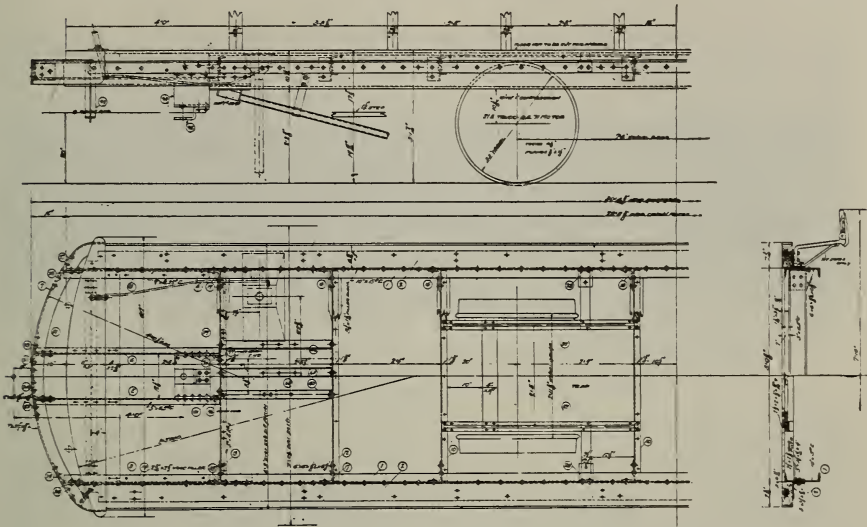


CARS FOR CORREGIDOR ISLAND. Standard Brill ten-bench open car on steel underframe. Mounted on Brill 21-E truck

of Brill 10-bench single-truck cars, except that the underframe in this instance is of steel, with deep subsills extending from bumper to bumper, resting on the upper chords of the Brill 21-E truck. This construction of the bottom frame raises the car floor several inches above the usual height and makes it unnecessary to use wheel housings in the floor. During the rainy season the bulkheads and heavy duck curtains, which extend down to the floor, afford protection. Pockets for the bulkhead

boards, and cherry sash frames constitute the varnished woodwork. Guard rails on each side slide behind the post grab handles, and are made in a single section.

On account of the number of long grades, which include curves in nearly every case, the cars are equipped with both wheel and track brakes, manually operated; also straight air brakes, giving three distinct means of braking. The brake handles are of the Brill (patented) Ratchet type; other equipments of the manufacturer's make



OPEN CARS FOR CORREGIDOR ISLAND. Length of body, 21 ft. 0 in.; over platforms, 28 ft. 8 $\frac{3}{8}$ in.; of platforms, 3 ft. 10 $\frac{1}{8}$ in.; centers of side posts, 2 ft. 8 in.; width over sills, 6 ft. 3 in.; width over posts, 7 ft. 0 $\frac{1}{2}$ in.; extreme width, 7 ft. 9 $\frac{1}{2}$ in.; track to side sills, 2 ft. 2 $\frac{3}{8}$ in.; side sills over trolley boards, 9 ft. 2 $\frac{3}{8}$ in.; track to step, 19 $\frac{1}{8}$ in.; step to floor, 17 $\frac{1}{2}$ in.; weight of body, 8,604 lb.; electrical equipment, 1,350 lb.; air brake equipment, 1,200 lb.; trucks, 5,900 lb.; motors, 7,480 lb.; total weight, 24,534 lb.

are sand boxes, alarm gongs, signal bells, drawbars, angle-iron bumpers and round-corner seat-end panels. The cars are 28 ft. 8 $\frac{3}{4}$ in. long over the crown pieces; 6 ft 3 in. wide over the sills; 7 ft. 1 $\frac{1}{2}$ in. wide over the posts at the seat ends; and the platforms are 4 ft. long from the center of end posts over crown pieces. From track to step,

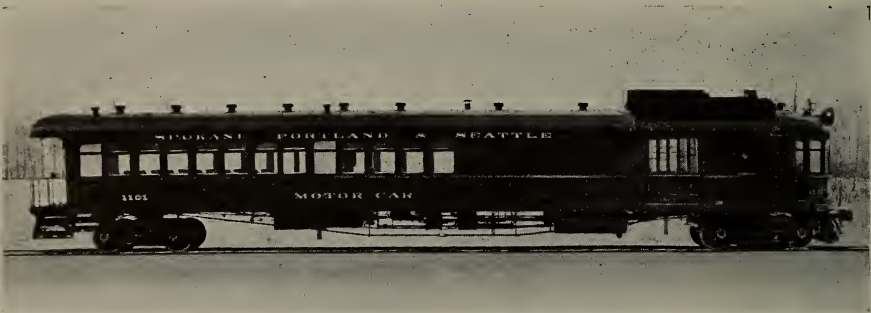
19 15-16 in.; from step to floor, 17 $\frac{1}{2}$ in. The seat centers are 2 ft. 8 in., and the ten benches, which are built with reversible backs, provide a capacity for 50 persons.

Brill 21-E trucks carry the cars and have a wheel base of 7 ft. 6 in. The diameter of the wheels is 33 in.; flange, 7 $\frac{7}{8}$ in.; diameter of axles, 4 $\frac{1}{8}$ in.

GAS-ELECTRIC MOTOR CAR FOR THE SPOKANE, PORTLAND & SEATTLE RAILWAY

THE Wason Manufacturing Company recently built the all-steel car shown in the accompanying engravings for the General Electric Company, which has a contract for furnishing the

car completely equipped for gas-electric operation to the Spokane, Portland & Seattle Railway. It is the first car of the type to be employed on this railway system, and is intended to be operated on the



GAS-ELECTRIC CAR. All-steel car built by the Wason Manufacturing Company and equipped with the General Electric Company's gas-electric system. An extra long baggage compartment is provided in this car.

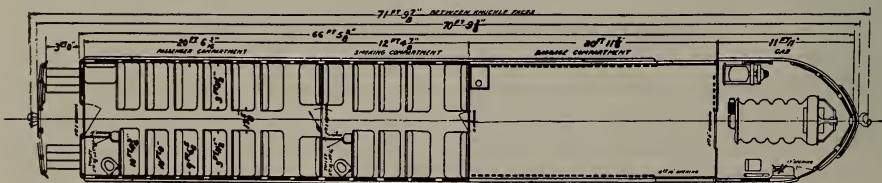
Astoria-Columbia Division of the system between Portland and Rainier, Oregon.

Portland and Rainier are 45.8 miles apart, and are now served by steam trains making two round trips each way per day. The present schedule gives the running time from Portland to Rainier as one hour and fifty minutes, and two hours for the reverse direction. The total distance for the four single trips is 183.2 miles.

The gas-electric car will be required regularly to haul one 25-ton trailer seating 60 passengers. At times when the traffic is heavy, it may be necessary to haul two trailers of this capacity on both round trips. The schedule of the train composed of the motor car and two trailers will be increased 10 min-

utes each run, with stops of not more than 30 seconds. The maximum grade on this section of the railway is one-half of 1 per cent., extending over a distance of about three miles; but in general the road follows the Columbia River grade, and is nearly level.

This particular car design is known as type RE-70-B-21, and the details of construction conform in general to standard gas-electric cars of the General Electric Company; it will be noticed, however, that the baggage compartment in this car is about twice the usual length, in order to transport the large quantity of express material handled, particularly the heavy shipments during the fruit season. The car is equipped with two GE-205, 600-1,200 volt, box frame, oil



GAS-ELECTRIC CAR. Width over all, 10 ft. 6 3/4 in.; seating capacity, 68; length of power plant compartment, 11 ft. 11 in.; baggage compartment, 20 ft. 10 1/2 in.; smoking compartment, 12 ft. 6 in.; passenger compartment, 20 ft. 5 1/2 in.

lubricated, series, commutating-pole railway motors, having a total of 200 horsepower capacity. The motors are mounted with nose suspension directly on the axles of the forward truck. They are insulated for 1,200 volts, so that they may be interchanged, if desired, with the motor equipment of the cars of the Oregon Electric Railway, which operates on the 1,200-volt system. The generating unit consists of an 8-cylinder, 4-cycle gas engine of the

“V” type, direct-connected to a 600-volt commutating pole electric generator, designed to meet the special conditions of the service.

The body of the car is of all-steel construction, with exception of interior finish, which is of mahogany. The trucks are of the heavy spring-bolster type, with elliptic bolster and coil equalizer springs; they have bearings, wheel treads and flanges conforming to M. C. B. standards.

CARS FOR QUITO, ECUADOR

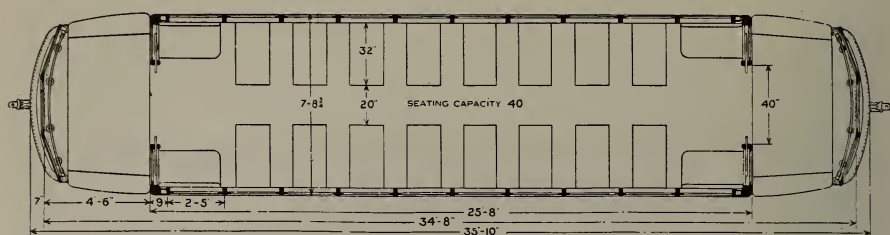
BRILL 76-E TRUCKS

A SHIPMENT of cars of the type illustrated left the works of The J. G. Brill Company last month for Quito, Ecuador, via the Panama Canal. The cars, which were ordered through the International Engineering Corporation, were loaded on a steamer at

New York, and were unloaded at Guayaquil for transshipment by the Guayaquil & Quito Railway, 150 miles from the port to the capital, Quito, which is in a valley in the West Cordilleras, at an elevation of over 9,000 ft. Quito has a population of about 70,000, and is noted



CARS FOR QUITO, ECUADOR. Standard type of single-truck car of the Quito Tramways Company, mounted on Brill 76 E trucks



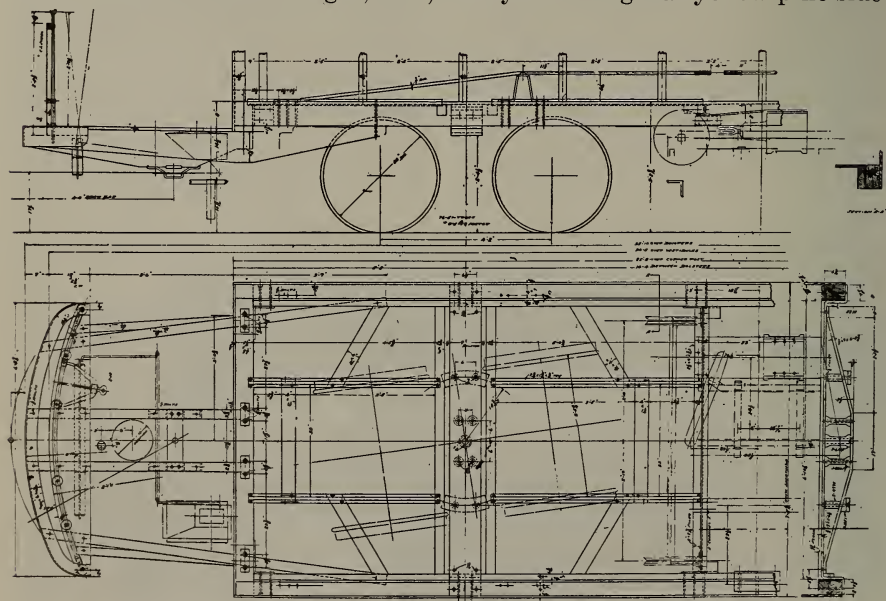
CARS FOR QUITO, ECUADOR. Width over sides, 7 ft. 8 $\frac{3}{4}$ in.; extreme width, 7 ft. 10 $\frac{1}{4}$ in.; track to side sills, 2 ft. 7 $\frac{3}{8}$ in.; side sills over trolley boards, 9 ft. 1 $\frac{1}{2}$ in.; track to step, 15-1 $\frac{1}{8}$ in.; step to platform, 14 $\frac{1}{2}$ in.; platform to floor, 8 in.

among the west coast cities for its delightful climate. Formerly the cars of the city system were drawn by mules, but for a long time the progressive metropolis of the republic has needed more adequate transportation, and the new equipment indicates the recent development.

Towering mountain peaks to the east and west of the city shorten the hours of direct sunlight, and,

together with the cool winds which blow through the valley, make it desirable to use closed cars. Speed as high as 30 miles an hour can be obtained on certain portions of the system, which is another reason for the closed bodies and also accounts for the operation with Brill 76-E trucks capable of that speed.

The bodies are built on a composite bottom frame, composed of 4 by 7-in. long-leaf yellow pine side



CARS FOR QUITO, ECUADOR. Composite underframe with steel plates sandwiched between double side sills. The crossings are of 3-in. channels, and the end sills of oak



CARS FOR QUITO, ECUADOR. Ash is used for the interior finish, with Brill "Winner" seats of the same. The lower side sashes drop into covered pockets

sills and $1\frac{3}{4}$ by 6 3-16-in. sub-sills, with 7 by $\frac{5}{8}$ -in. steel plate sandwiched between the two sills. End sills of oak are $5\frac{1}{4}$ by $8\frac{7}{8}$ in., and the crossings are composed of 3-in. channels. Both outside and center platform knees are of $2\frac{3}{4}$ by $11\frac{1}{4}$ -in. oak. Built-up bolsters are made of a 9 by $\frac{3}{4}$ -in. top plate and a 9 by $\frac{7}{8}$ -in. bottom plate. Narrow yellow pine boards, 13-16 in. thick, are used for the flooring, and in the aisle are covered with maple mat strips the entire length of the car.

In the upper structure ash is used for the corner posts, which are $3\frac{7}{8}$ in. thick, and side posts, $2\frac{1}{4}$ in. thick. Vertical tongue-and-grooved poplar boards are employed for the

side sheathing. The roof is of the standard monitor deck type, with the usual reinforcement of steel rafters. Ten pivoted ventilator sashes are placed on each side of the monitor deck and glazed with wire glass; the transom sashes are stationary. Double sash windows, ten to each side, have the upper sashes stationary and the lower arranged to drop into pockets in the side walls. Mutually-operating double sliding doors are made to give a 40-in. door opening between posts. Ash is used for the doors, sashes and interior finish, and the ceiling is of carline finish, with roof boards showing. Eight transverse seats on each side of the car are of Brill

"Winner" type, and are fitted with bronze grab handles. A longitudinal seat occupies the space of one window at each corner. Seats and backs are made of ash slats. Under the corner seats the space is paneled up, and sand box hoppers at diagonal corners and lockers at the other corners are enclosed.

Wind shields protect the platforms, and Brill folding gates guard the entrances at each side. The usual equipment of Brill pat-

ented specialties, such as "Dendenda" gongs, "Retriever" signal bells, "Dumpit" sand boxes, and Radial drawbars, are provided. The trucks have the Brill Graduated Spring System, which automatically puts bolster coil springs in motion under light loads, and thereby increases the easy riding qualities; they have also solid forged side frames, "Half-Ball" brake hangers, and are standard throughout.

ONE-MAN CARS FOR GREELEY, COLORADO

BRILL 21-E TRUCKS

THE Greeley & Denver Railroad Company has recently put in operation several cars of the type illustrated on its system at Greeley. These were built by the American Car Company. Greeley has about 10,000 popula-

tion, and is located in one of the richest farming sections of Colorado, about 50 miles northeast of Denver. It is on three railways, and is the business center for a considerable district.

The electric lines are in the form



ONE-MAN CARS FOR GREELEY, COLO. The cars have doors at diagonal corners and are equipped for double-end operation. Mounted on Brill 21-E trucks

of a loop, extending around through the residence section and passing through the principal business street. In addition, there is a two-mile line to Island Grove Park, north of the city, on a branch of the South Platte River. There is also a $3\frac{1}{2}$ -mile line running

pected before long to extend the lines into the eastern part of the city, where a large sugar factory is located. The new cars are the first on the lines to be operated by a one-man crew, and replace double-truck cars which have been operated by two-men crews. The



ONE-MAN CARS FOR GREELEY, COLO. The upper sashes are stationary and are framed with a continuous rail to strengthen the light superstructure. The lower sashes raise their full height

from the business district through the southern part of the city to the State Normal School. With the exception of a double-track section through the principal business streets, the lines are of single-track construction. The grades encountered are one mile of $2\frac{1}{2}$ per cent., four miles of 3 per cent., and about 500 ft. of 4.85 per cent. It is ex-

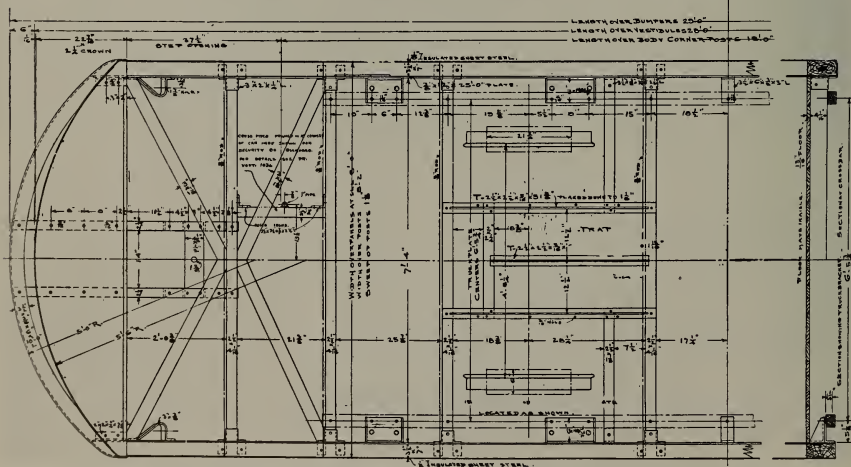
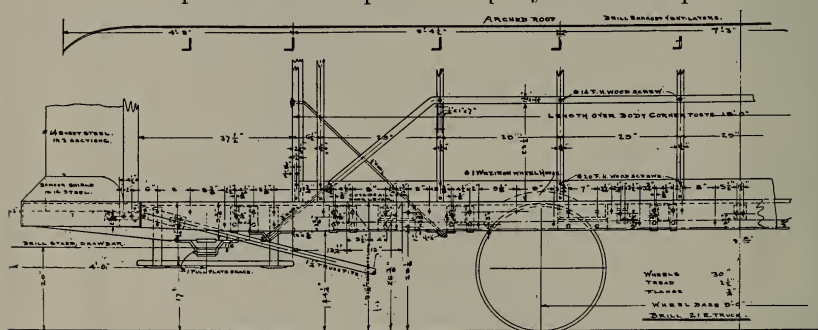
pected before long to extend the lines into the eastern part of the city, where a large sugar factory is located. The new cars are the first on the lines to be operated by a one-man crew, and replace double-truck cars which have been operated by two-men crews. The

The cars are built on a wooden underframe composed of long-leaf

yellow pine side sills, $3\frac{1}{2}$ by 7 in., reinforced on the inside with 12 by $\frac{3}{8}$ -in. steel plate. The end sills and center cross joists are of $2\frac{1}{2}$ by 4 1-16-in. white oak; inside truss rods are carried on the side posts immediately under the belt rails. Other details will be seen in the accompanying diagram of the framing.

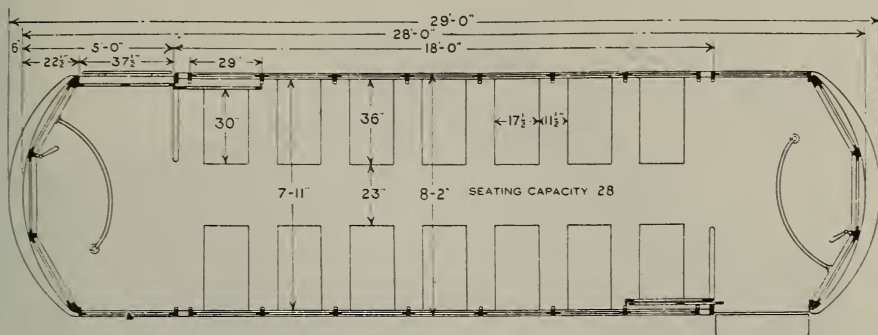
The upper structure is formed with $1\frac{1}{2}$ -in. side posts, $2\frac{1}{2}$ -in. corner posts and $4\frac{1}{2}$ -in. vestibule posts. Angle steel rafters support the plain arch roof and are placed over each side post. The side posts

are sheathed with $\frac{1}{8}$ -in. insulated sheet steel and protected with a guard rail between the upper and lower panels. A continuous rail, to strengthen the light post construction, is secured by framing the upper sashes together from door post to end of car on each side. Angle iron bumpers strengthen as well as protect the ends, and are surmounted with No. 14 sheet steel guards. Sliding doors at the diagonal corner have $37\frac{1}{2}$ -in. openings, and are operated in conjunction with the folding step by a handle placed over the



ONE-MAN CARS FOR GREELEY, COLO. Yellow-pine side sills are reinforced by 12 by $\frac{3}{8}$ -in. steel plate. The end sills and crossings are of white oak

BRILL MAGAZINE



CARS FOR G. & D. R. R. COMPANY. Width over sills, 8 ft. 0 in.; width over posts, 8 ft. 2 in.; extreme width, 8 ft. 5 in.; height from track to side sills, 2 ft. 0 1/4 in.; side sills over trolley boards, 8 ft. 10 1/4 in.; floor to center of headlining, 7 ft. 11 1/4 in.; track to step, 17 in.; step to platform, 14 1/4 in.; weight of body, including air and electrical equipment (approximate), 8,000 lb.; weight of trucks, (approximate), 6,000 lb.

vertical hand brake at each end.

The lower sashes are arranged to raise their full height, and, as the window sills are low, arm rests are provided. There are seven Brill reversible-back seats of the "Winner" type on each side of the aisle, giving a seating capacity of 28. A sheet steel barrier, with pipe railing at the top, encloses the motorman's position. Cherry is used for the interior finish, including the doors, sashes and mould-

ings; agasote forms the ceiling. Two double sash and one single center sash are provided in the ends; the lower sashes are arranged to drop in metal stiles, and the center sash to drop in a pocket. Brill "Exhaust" Ventilators are furnished in the equipment, also "Dedenda" gongs, "Retriever" signal bells, "Dumpit" sand boxes, Radial drawbars, vertical brake wheels and other specialties of Brill manufacture.

HOT SPRINGS, ARKANSAS

HOT SPRINGS, Arkansas, is one of the points of the Great Southwest that is benefiting by the large amount of transcontinental travel, and this year will probably double its transient population, which for many years has been over 150,000 annually.

The Hot Springs Street Railway Company operates 32 motor passenger cars on its 14 miles of

lines, the standard type being single-truck cars furnished by the American Car Company and mounted on Brill 21-E trucks. Some of these cars are shown in the accompanying photographs and are admirably suited to the short haul traffic characteristic of the system.

Hot Springs is not far southwest of the center of the State, and is located at the easterly base of the

Ozark Mountains. The central part of the city is on a plateau surrounded by mountains, and the outlying streets in a number of directions extend into mountain ravines. It is considered to be one of the most beautiful small cities in the country, and the surrounding hills and mountains provide a setting of rare attractiveness. From the steel tower observatory, which rises 150 feet over the top of Hot Springs Mountain, a vast panorama of wooded mountains, hills and fertile valleys, and below is the city of splendid hotels, impressive government buildings and fine tree-lined residence streets.

The climate of Hot Springs is delightful the year round, with enough rainfall to keep the verdure of the hills and valleys fresh and the numerous streams bountifully supplied. There are 44 springs arising within an area of three acres on the slope of Hot Springs Mountain, and all are included within a reservation held by the United States Government, which has exercised complete jurisdiction for the last 12 years. From these springs a daily flow of over 800,000 gallons is utilized in the bath houses and drinking fountain pavilions. The temperature of the water varies from 95 to 147 degrees Fahrenheit, and the waters

are tasteless and inodorous. The water from the springs is radioactive and contains chemical properties which differ in the various springs and are prescribed by the resident physicians for their healing effect on certain complaints. A number of cold springs also have curative virtues. At the foot of the Hot Springs Mountain, and at the side of Central Avenue, is the famous "Bath House Row," consisting of 11 large houses equipped with baths and maintained by the government. Besides these are 13 other houses on private property, also equipped with vapor, needle and plunge baths, and pavilions equipped with drinking fountains are in many places.

The government maintains an army and navy hospital, very attractively located on a knoll overlooking the city. One of the principal hotels in Hot Springs has a capacity for 1,000 guests, and two have a capacity for 500 each. The business of the city consists mainly in caring for its visitors, and in the neighborhood the farms are principally employed in fruit raising and market gardening. Fine golf links, tennis courts, excellent roads for motoring, and other attractions, add their interest to this beautiful and healthful mountain resort.

*The Brill Graduated Spring System is standard
in all Brill pivotal trucks for city service*



Views on Central Avenue, Hot Springs, showing cars built by the American Car Company, and mounted on Brill 21-E single trucks. Lower illustration shows the famous "Bath House Row"

SUGGESTIVE SUBJECTS

NOTE.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

SOME THINGS A TROLLEY CAR TEACHES

PUT a lightning arrester on your temper.

Have plenty of sand for the up grades and slick rails of life.

Your conscience is the hammer with which to sound every wheel of your conduct.

Don't let up on your vigilance on straight track.

Show your route and destination signs, and have reason to be proud of them.

Your memory is intended to be a register, not an exhaust ventilator.

Switch on the lights of cheerfulness when darkness approaches.

Equip yourself with multiple-unit control and be ready at all times to pull together.

A control system includes resistance—just as much needed in a man as in a trolley car.

Use plenty of the oil of common sense and courtesy and you will not heat up.

Keep your outlook window clear of obscuring jealousy and prejudice.

FACE VALUE

ACOURTEOUS-serious-alert face is a valuable part of a conductor's equipment.

It is easier to be courteous than grouchy. It is taking the line of least resistance. There is always a "come-back" to grouchiness, always a help forward in courtesy. Grouchiness is not only unmannerly; it is unmanly. Courtesy puts both pleasantness and dignity on a man's face.

The man who is thoughtful and realizes his responsibilities gains a quality that employers call serious-mindedness. The serious-minded man can't help showing it in his face, and he is always what he looks—dependable. Being serious-minded doesn't cut fun out of the program of life, but puts it where it will be a help, not a hindrance.

Alertness is the habit named in the A B C (Alacrity, Brains and Character) qualities that bring success. To be keen, watchful and prepared, to be on tiptoe for important things, puts an alert look on a man's face. Get the look—it's professional.

HERE'S TO YOUR GOOD HEALTH

DRINK anywhere from a quart to six pints of water a day. Avoid ice water.

The less fried food you eat the better, especially during warm weather.

Hang your clothes at night where they will air thoroughly.

Don't slouch as you stand; it tires instead of rests the body.

Bathe every day. Put on a clean pair of socks every morning; this is highly important.

Take good care of your teeth, and they will take good care of you.

Keep a piece of castile soap on your wash basin for cleansing your eyelids, especially after dusty days.

Conductors should wash their hands thoroughly with antiseptic soap on returning home. They should never rub their eyes with their fingers after handling money.

Regulate your habits to what best suits your health.

Tobacco does not have the same effect on everyone, so don't gage your smoking capacity by others.

Don't let a barkeeper prescribe for you or go to a drug clerk for medical advice. Go to a doctor; it costs less in the end.

Give yourself plenty of fresh air, but no direct drafts, while sleeping.

Sleep at least eight hours out of every twenty-four. Regular health demands regular sleep.

THE MANAGER'S FEELINGS

EVERY manager desires to keep in personal touch with the men who come under his direct or indirect control. He realizes their viewpoints in nearly every case and cares more for their individual feelings than he permits himself to show or even to think. The nature of his duties as an executive, not the disregard of their needs and feelings, as is sometimes thought, isolates him from the personal contact which he deeply wishes. He knows that talking to men in a mass has little effect on his relations with them, and that only working alongside of them could bring about a full understanding. That is, of course, impossible, and, no matter what he endeavors to do to improve the working conditions of employes and to make his organization more efficient, there will always be those who will either not understand or impute motives that are farthest from his mind. But the manager goes ahead with his work undaunted by such things, knowing that in the end the square deal he is trying to give to all will be recognized and appreciated.

SELF-MADE RULES

The man who makes no rules to govern his own conduct usually has a hard time living up to the rules made for him.

PREJUDICE

BECAUSE you are used to doing a thing in a certain way is no proof that it is the best way. Remember the old saying, "There is always room for improvement," and if you don't see the better way of doing a thing don't kick when you are shown simply because it is different from what you are used to. Be unprejudiced and progressive, for your own sake as well as the company's.

BOOSTING

BOOSTING is good business. Boost the company, boost the fellow next to you, boost yourself. Boosters naturally flock together, for they are in for good team work every time, and they are forever trying to get others to wear the Boosters Club button, which has the words "Safety, Efficiency, Courtesy." Join the Boosters Club—every member is a worker and making good.

CHANGES OF ADDRESS

THOSE who receive BRILL MAGAZINE are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.

INTERURBAN CENTERS AND INTERURBAN CARS

Continued from page 109

ment conforms to standard steam railway practice, and the methods of operation follow closely those laid down by well-established railway systems. Home-made locomotives, using four 50 h. p. motors, and weighing 30 tons, were first used in this service. The next class of locomotives built for the company weigh 40 tons and have 75 h. p. motors. The standard ma-

chine weighs 62 tons and has four 200-h. p. motors, with a maximum drawbar pull of 30,000 lb., enabling it to haul 53 standard coal cars loaded to capacity on a level track.

The number of passenger cars used in normal operation is 90; average stops per mile, 27; number of fare passengers carried in 1914, 8,365,738; tons of freight carried in 1914, 675,042.



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PACIFIC COAST—Pierson, Roeding & Co., 118
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Seattle

AUSTRALASIA—Noyes Brothers, Melbourne, Sid-
ney, Dunedin, Brisbane, Perth

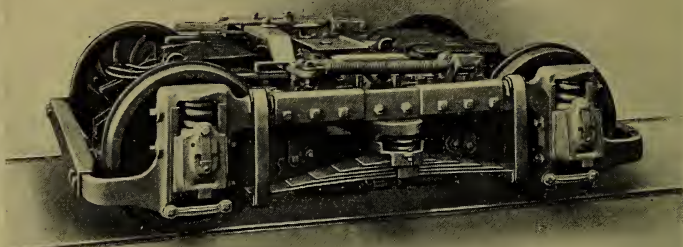
BELGIUM AND HOLLAND—C. Dubbelman, 48
Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—Shackleford &
Co., Calle Bartolome Mitre 478, Buenos Aires

NATAL, TRANSVAAL AND ORANGE RIVER
COLONY—Thomas Barlow & Sons, Durban, Natal

CHINA—Shewan, Tomes & Co., Hong Kong, Can-
ton, Shanghai

ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan

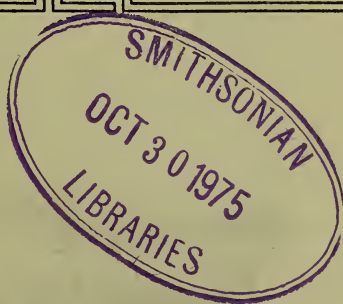


THE BRILL 77-E TRUCK

THIS truck is designed for 24-in. wheels and small inside-hung motors. The standard wheel base is 5 ft. 1½ in.; the height from track to body bolster with weight of empty car is 22 inches. Brill solid forged side frames have very distinct advantages in this compactly constructed truck. Having no frame trussing enables the spring links to be placed at wide-apart points. Superior riding qualities are secured by the combination of plate and coil bolster springs which graduate the spring action for light and heavy loads. In other words, the bolster coil springs are automatically put in action under light loads. The arrangement is known as the Brill Graduated Spring System.

THE J. G. BRILL COMPANY, PHILADELPHIA

BRILL MAGAZINE



Clinton Square
Syracuse, N.Y.



RATTAN SEATING MATERIAL

BRILL Twill-Woven Rattan Seating Material is made of selected, hard cane, jointed by a process which prevents splitting or fraying. Unlined for seat backs and canvas-lined for cushions. It is durable, sanitary and easily cleaned. Ready for immediate shipment in rolls from 18 to 36 inches wide, any length.



J. S. Penner.

PRESIDENT, UNITED GAS AND ELECTRIC ENGINEERING CORPORATION

Consider the men whose names mean efficiency, achievement, success. Notice that practically everything they undertake comes out as it should.

The reason is simply that these men have the habit of making good. There is no luck about it. They have acquired a habit.

That habit—the habit of making good—was gained by hard work and the unsparing expenditure of energy.

The successful conduct and development of the railway industry requires the services of thousands of men who are chosen for their fitness for the positions to be filled.

And in proportion to a man's fitness is his career. If a trial proves him to be unfit, he is dropped. If he proves his fitness for a higher post, he gets it in due course.

The opportunities in the railway field are practically without limit. Given a normal brain and the desire and energy to develop it, there is no position to which a man in the ranks may not rise.

It is necessary to the progress of the railway industry that men in the ranks should rise. The industry is not a thing of today alone. Means of transportation will always be in demand, and the man most fit will be the man who will lead in supplying the demand.

MAY 15, 1915

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J. S. PEVEAR

J. S. PEVEAR, President of the United Gas and Electric Engineering Corporation, first became connected with this organization in May, 1913, when he assumed the duties of Vice-President and General Manager of the International Railway Company in Buffalo. In December, 1913, he went to New Orleans as Vice-President of the American Cities Company and Vice-President of the United Gas and Electric Engineering Corporation, to look after the interests of the Engineering Corporation in the south. He was previously connected with the Twin-City Rapid Transit Company, of Minneapolis, in the capacity of Superintendent of the St. Paul lines, and with the General Electric Company. The United Gas and Electric Engineering Corporation, which has its head offices in New York, acts as consulting, contracting and operating engineers for all classes of public utility properties, and is now acting in this capacity for the following companies: Altoona Gas, Lt. & Fuel Co. (Pa.), Citizens' Gas & Fuel Co. (Terre Haute, Ind.), Consumers Elec. Lt. & Pwr. Co. (New Orleans, La.), Harrisburg Lt. & Pwr. Co. (Pa.), Houston Gas & Fuel Co. (Tex.), International Traction Co. (Buffalo, N. Y.), Lancaster County Ry. & Lt. Co. (Pa.), Little Rock Ry. & Elec. Co. (Ark.), Memphis St. Ry. Co. (Tenn.), Richmond Lt., Ht. & Pwr. Co. (Ind.), Birmingham Ry., Lt. & Pwr. Co. (Ala.), Colorado Springs Lt., Ht. & Pwr. Co. (Colo.), Elmira Wtr., Lt. & R. R. Co. (N. Y.), Hartford City Gas Lt. Co. (Conn.), Houston Ltg. & Pwr. Co. (Tex.), Knoxville Ry. & Lt. Co. (Tenn.), Leavenworth Lt., Ht. & Pwr. Co. (Kan.), Lockport Lt., Ht. & Pwr. Co. (N. Y.), New Orleans Ry. & Lt. Co. (La.), The Wilkes-Barre Co. (Pa.), and Union Gas & Elec. Co. (Bloomington, Ill.). Of the foregoing public utility companies, those of New Orleans, Birmingham, Memphis, Little Rock, Knoxville and Houston are controlled by the American Cities Company, which is in turn controlled, through common stock ownership, by the United Gas and Electric Engineering Corporation.

INTERURBAN CENTERS AND INTERURBAN CARS

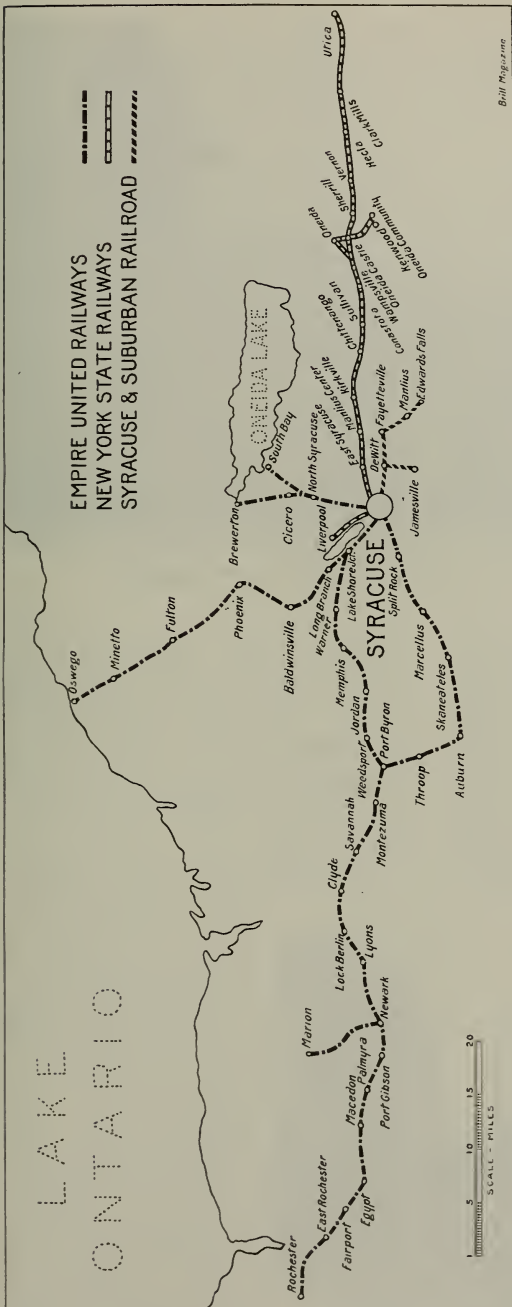
SYRACUSE

NEAR the center of the State of New York, on the comparatively level belt of land bordering Lake Ontario, is located one of the most enterprising cities of the State—Syracuse. It is one of several whose important development dates from the opening of the Erie Canal, which in the early days was the chief means of transportation across the State. Along this route and the Oswego Canal, which branches from the Erie Canal at Syracuse, other communities were established, and when the railroads later traversed the region they followed the same course, and Syracuse, with its favorable location and natural advantages, developed rapidly and became the commercial center of the communities, which developed into large towns and small cities. All of the region is exceedingly fertile, but because of the hilly nature of the land south of the city the chief lines of transportation have continued to be east and west, and therefore the development of the territory, in regard to cities, towns and rural population, has been in the same direction.

While in the midst of a prosperous farming and fruit-growing district, Syracuse is distinctly a manufacturing city, and the manufactures are remarkably diversified. The manufacture of chemicals, automobiles and typewriters lead among the industries; the great salt wells of the neighborhood and

an immense plant of the Solvay Process Company give employment to thousands of workmen. The wholesale dry goods trade is also a large factor in the commercial life of the city and furnishes a local means of supply to the retail stores of the city and neighborhood. Syracuse University is a comparatively recent institution, but because of its large financial backing has grown to an average attendance of 3,200 students, and, together with other large schools and colleges, the city has assumed an important place among the educational centers of the country. The population of Syracuse, according to the census of 1910, was 127,249, and in the last five years this has grown to a present population of 154,000.

Although the lines of transportation crossing this section of the State run chiefly east and west, and the interurban electric railway development has mostly followed in its wake, the city itself has been unlimited in the direction of its development, as the land is level and comparatively unobstructed; therefore, the city railway system is radial in character and extends beyond the borders in all directions. The city lines are operated by the New York State Railways Company, which also operates the city systems of Utica and Rochester. The Oswego lines are operated by the Empire United Rail-



ways. Both the New York State Railways and the Empire United Railways have large interurban divisions not shown in the accompanying map, as they do not form a part of the interurban lines which directly center at Syracuse.

The section of the New York State Railways shown in the map is known as the Oneida Line, and is the electrified section of the West Shore Railroad from Syracuse to Utica, a distance of about 44 miles. The principal points on the line are East Syracuse, with a population of 3,274; Canastota, 3,700; Oneida, 9,000, and New York Mills, 2,500. Including the terminal cities and the population along the route, the Oneida Line has a tributary population of 300,000. Connections are made with steam lines and other interurban lines, including other divisions of the New York State Railways, at all principal points.

When the West Shore was electrified between Syracuse and Utica about ten years ago, and became the Oneida Railway, it was classed among the most important main line electrifications up to that time. Formerly the line was of double track throughout,



INTERURBAN CENTERS AND CARS. Canastota Station of the New York State Railways, 21 miles east of Syracuse. Under-running third rail system

but to accommodate the different classes of service, permitting faster units to pass local trains, a third track was provided between Clark's Mills and Vernon, a distance of 9 miles. Between Utica and Canastota a four-track section, nearly five miles long, was installed to enable electric trains to

pass steam trains that may be held in this section owing to the presence of water stations and freight yards. The tracks throughout are laid with 80-lb. rails, and are equipped with under-running third rail to the boundaries of the terminal cities.

The form of third rail employed is the bull-head type, 70 lb. per yard, and protected in part by a wooden sheath and in part by a moulded fibre sheathing. At all breaks third-rail jumpers are used which have a capacity of 1,000,000 cm., and the cable is heavily insulated and housed in a 3-in. iron pipe. Current for the third-rail system



INTERURBAN CENTERS AND CARS. Between Syracuse and Utica, 30½ miles are laid with two tracks, 9 miles with three tracks and about 5 miles with four tracks



INTERURBAN CENTERS AND CARS. Vernon Station, 32 miles east of Syracuse, and at the western end of the triple-track section

is obtained from the company's hydro-electric plant on the upper Hudson River, and from its steam plant in Utica, and delivered at 60,000 volts at four sub-stations spaced at an average distance of approximately $10\frac{3}{4}$ miles. The high-tension three-phase current is reduced in pressure and converted to a direct current of 600 volts.

Steam road conditions, of course, largely govern the service, and yet, after leaving the main tracks, the cars run through city streets, stopping at crossings wherever necessary to let off or take on passengers. The New York State Railways terminal station at

Syracuse is on Clinton Square, which is shown in the front cover illustration, and faces the monument. From this point limited trains are operated every hour of the day, and local trains are dispatched five minutes later and run through to Utica every hour up to 7.35 P. M., after which there are



INTERURBAN CENTERS AND CARS. Typical grade crossing. Third-rail jumpers are heavily insulated, and housed in 3-in. iron pipe



Power station of the New York State Railways at Utica
Car shop at Syracuse

Sub-station at Clark Mills; identical sub-stations are at Vernon, Canastota and Manlius Center

two evening trains. The limiteds make the trip with two stops en route in 1 hour 28 minutes; the run between the city boundaries is made in 60 minutes and over the local lines within the cities requires 28 minutes. Local cars or trains make the run in 1 hour 58 minutes, with an average of .92 stops per mile. A general express

any, with full empire ceilings and Brill semi-convertible windows. These cars are mounted on Brill 27-E2 trucks equipped with four motors per car of 75 hp. each, and all cars are equipped with multiple-unit control. A number of cars built by the G. C. Kuhlman Car Company in 1912 have a parabolic front end to reduce wind resistance.



INTERURBAN CENTERS AND CARS. Three-car train of the New York State Railways. Length of body, 40 ft.; length over vestibules, 48 ft.; seating capacity, 52

business is carried on, with two trains daily each way, making all stops.

The standard rolling stock of the Oneida Railway is shown in the accompanying illustrations, and consists of main and smoking compartment cars. They are constructed with underframes having intermediate and center sills of 6-in. I-beams, wooden side and end sills, and 15 by $\frac{3}{8}$ -in. steel plates. The interiors are finished in mahog-

These cars have an all-steel end frame, steel side plates and extra deep center sills; they have main and smoking compartments and cab for the operator, and train door on the rear platform. Trucks of the Brill 27-MCB2 type are equipped with 70 hp. motors, four per car. The express cars have two 6-ft. wide doors on each side, and swing doors at diagonal corners. They are mounted on Brill 27-E2 trucks.

The number of cars available for



INTERURBAN CENTERS AND CARS. New York State Railways semi-steel type with parabolic front end. Length over vestibules, 52 ft. 3½ in.; length of rear platform, 5 ft. 0½ in.; seating capacity, 57

passenger service on the Oneida Line is 17, of which 12 are used in normal operation. Other types of equipment used are 2 express cars of the type illustrated, and 1 shear snow plow with flanger attachment. In 1914, 1,329,099 passengers were carried and 836,011 car miles operated. The express matter carried for the year amounted to 5,851 tons.

The main line of the Empire

United Railways runs directly west from Syracuse to Rochester, a distance of 86½ miles. This division traverses a rich farming country and serves a string of important small manufacturing cities and rural centers with a through hourly schedule in either direction, and in addition a frequent local service between Port Gibson and Rochester and between Jordan and Syracuse. The tributary population of this



INTERURBAN CENTERS AND CARS. Standard express car of the New York State Railways. Length over vestibules, 56 ft.

division is 48,650, not including the terminal cities. From Newark to about midway between cities a branch extends to Marion, a distance of 10 miles.

Running in almost a direct line from Syracuse to Auburn is a 27-mile division, with a connection between Auburn and Port Byron, 8 miles distant, on the Main or Rochester & Syracuse Division. Auburn has a population of 37,000, and, with the other points on this division, furnishes a tributary population of 40,000. Limited and local trains alternate on an hourly schedule, running east and west between Syracuse and Auburn, and from Auburn to Port Byron there is also an hourly schedule, making close connections with all trains on both divisions. The Syracuse-Oswego Division is 38 miles long and extends along the west shore of Onondaga Lake and along the Oswego River. Oswego is a busy manufacturing city of 25,000 population, and Fulton, about midway of the division, has 12,000. The population tributary to this division is 19,100. There is a half-hourly service, alternating local and limited trains, between Syracuse and Oswego, as traffic is heavy during all hours of the day

from 5 in the morning until midnight.

Still another division runs north from Syracuse to South Bay, on Oneida Lake, and has a branch to Brewerton, also on the lake. This division has a tributary population of 3,000, but carries a large amount of traffic during the summer season



INTERURBAN CENTERS AND CARS. Typical view on the eastern part of the Empire United Railways, which is largely equipped with catenary trolley

because of the popular amusement grounds on Frenchman's and Dunham's Islands, and 300 acres of frontage on Oneida Lake owned by the company; also because of other resorts in the neighborhood.

Including the terminal cities, the four divisions have a tributary population of 540,000. All of the lines are on private right-of-way, with the exception of the 8-mile

section between Auburn and Skaneateles. On all four divisions there are 92½ miles of single track, 97½ miles of double track, making a total of 141 miles of line and 190 miles of track.

Overhead trolley, of both catenary and direct suspension, is employed, and as the lines are on private right-of-way and cross few streets in the towns and cities along

grades throughout are easy, with the exception of the Auburn-Syracuse Division, where several that are steep but short are encountered. Plate girder bridges are used where the spans are 60-80 feet, and trussed bridges for spans over 80 feet. Concrete bridges are used for highway crossings and culverts, and throughout the system the bridges and culverts are in accord-



INTERURBAN CENTERS AND CARS. Repair shop and car house of the Empire United Railways near Syracuse. A large repair shop is centrally located at Newark

the routes, the catenary bridges also carry high-tension lines. Copper feeder cables, instead of steel, are used for the catenary messenger wires, thereby eliminating an outside feeder. The standard weight of rail on the Empire United Railways is 70 lb. on private right-of-way and 90 lb. in villages and towns; the only exception is the line to South Bay, which is laid with 85-lb. rails. Practically all of the track of the system is laid on crushed stone ballast, and the

ance with the most modern steam-road construction.

Current is obtained from Niagara Falls and from the company's steam plants at Auburn and Lyons. The sub-stations are located generally 10 miles apart, and receive the current at 33,000 volts, 3-phase, 25 cycles.

The standard type of car used on the various divisions of the Empire United Railways is shown in the illustrations, and measures 42 ft. 9½ in. over the body and 52 ft.



INTERURBAN CENTERS AND CARS. Three-car train of the Empire United Railways.
Length over vestibules, 52 ft. 2 $\frac{3}{4}$ in. Seating capacity, 58

25 $\frac{1}{2}$ in. over the vestibules; width over sheathing, 8 ft. 3 in. These cars have plate girder sides, I-beam center sills with wooden fillers, and yellow pine side and intermediate sills; the side sills are reinforced with steel angle. All of the cars are equipped with multiple unit control.

In normal operation, the following numbers of interurban cars are used on the various divisions: Rochester-Syracuse, 25; Syracuse-Oswego, 12; Syracuse-Auburn, 5; Syracuse-South Bay, 2. In addition to the foregoing, there are a considerable number of cars on each of the divisions available for



INTERURBAN CENTERS AND CARS. Trailer parlor car coupled to motor passenger car

summer and special service, especially on the Syracuse-Oswego and Syracuse-South Bay Divisions, where open interurban cars carry much of the summer traffic. The actual number of interurban cars available on the various divisions is as follows: Rochester - Syracuse, 25; Syracuse-Oswego, 12 closed and 15 open; Syracuse-Auburn, 12 closed and 2 open; Syracuse-South Bay, 11 closed and 10 open.

792 passengers, 1,671,571 miles, 7,291 tons freight; Syracuse-Oswego Division, 2,759,415 passengers, 1,283,878 miles, 10,383 tons freight; Syracuse-South Bay Division, 459,900 passengers, 242,797 miles, 6,089 tons freight; Auburn Port-Byron Division, 338,339 passengers, 131,632 miles, 182 tons freight; Syracuse, Watertown and St. Lawrence Division, 135,030 passengers, 73,133 miles.

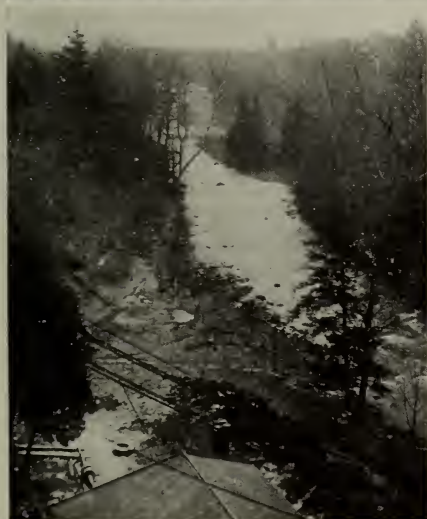


INTERURBAN CENTERS AND CARS. Express car train of the Empire United Railways

Additional equipment of the Empire United Railways is as follows: 1 motor parlor car, 1 trail parlor car, 10 double-truck snow plows, 4 single-truck snow plows, 2 sweepers, 3 double-truck work cars, 1 single-truck sand car.

For the year 1914 the Rochester-Syracuse Division of the Empire United Railways carried 4,391,059 passengers, operating 2,326,547 car miles; freight carried, 13,967 tons; Syracuse-Auburn Division, 4,824,-

The Syracuse and Suburban Railroad serves the territory southeast of Syracuse, and extends through one of the most attractive regions in the neighborhood of Syracuse. The line extends along the old Genessee and Fayetteville turnpike from Syracuse to Manlius, and a short distance further reaches its terminus at Edwards Falls, a remarkably picturesque spot, where a small river makes a plunge of nearly 100 ft. and winds itself



VIEWS ON THE SYRACUSE & SUBURBAN RAILROAD. Orville Junction, where the Jamesville line branches
 Edwards Falls, from hydro-electric power station Typical shelter station
 Repair shop and car house at Edwards Falls



INTERURBAN CENTERS AND CARS. Standard passenger car of the Syracuse & Suburban Railroad. Length of body, 34 ft. 4 in.; length over vestibules, 44 ft. 4 in. Seating capacity, 48

around through a rocky, wooded gorge. This spot has been developed as a railway park, and attracts large numbers of excursionists and visitors. There is another interesting falls at the end of the Jamesville branch of the system, and both have been well advertised and are extensively patronized. Principal points on the line are Fayetteville, which has 1,500 population; Manlius, 1,500, and Jamesville, 1,500; it is estimated that the tributary population aggregates about 14,000.

The lines consist of 16.68 miles of single track and 1.84 miles of double track. All the lines are alongside of highways, and the cars are, therefore, designed for this class of interurban service. Nine cars of the type illustrated are used in normal service, and 14 are available. They are of the Brill semi-convertible type, with smoking compartment seating 16, and main compartment seating 32.

The cars are built on wooden bottomframes, in which the side sills of yellow pine are reinforced their full length by 15 by $\frac{3}{8}$ -in.

steel plate. The end sills, crossings and diagonal braces are of oak, and the platforms are supported on oak knees reinforced with angles. The length over the corner posts is 34 ft. 4 in., and over platforms, 44 ft. 4 in.; width over sills, 8 ft. $0\frac{1}{2}$ in. Weight of car body, together with electrical and air equipments, trucks and motors, is 50,000. The cars are mounted on Brill 27-MCB1 trucks, which are capable of a speed of 50 miles an hour, although the maximum speed is but 30 miles. Additional equipment consists of 1 single and 1 double-truck work car, a single-truck snow plow, a single-truck line car and a single-truck trail work car.

The line was built in 1897-98, and the traffic has been well developed and is steadily increasing. Package express and local freight and milk business have been fostered, and last year 14,500 tons of freight and milk were carried; there is no available record of the amount of express matter. During the same year, 1914, 1,217,000 revenue passengers were carried, and a total of 515,420 miles operated.

75 CENTER-ENTRANCE TRAIL CARS OF NEW TYPE FOR BOSTON

BRILL 53-F TRUCKS WITH 24-INCH WHEELS

THE illustrations show the first of a lot of 75 trail cars ordered by the Boston Elevated Railway Company from The J. G. Brill Company. These cars are intended to relieve rush-hour traffic, and will at first be used only for that service. They will run from 7 to 9 in the morning and from 4 to 6.30 in the evening, and will be operated on the following lines: Clarendon Hill, Copley Square, Pleasant Street, North Cambridge, Harvard Square, Watertown, Arlington Heights, Harvard Square, Lake Street, Washington Street, Commonwealth Avenue, Park Street Subway, Reservoir, Coolidge Corner, Park Street Subway, Newton Line, Park Street Subway, Watertown Station, Park Street Subway. Near-side and farside stops are both made on these lines.

To provide a trail car with a seating capacity of 62 and a wide and low center entrance, it was necessary to design the underframe in a manner which would reduce the weight to a minimum. The sides were therefore designed in the girder form and arranged to carry the entire load. By spacing the bolsters apart half the length of the car, the weight of each half is balanced on its truck, thereby reducing the strain at the center entrance and avoiding a heavy construction around the center doors.

The side plates are of $3/32$ -in. thickness and riveted to continuous angle sills which are depressed 18 in. to provide for the low center platform. At the top of the plates is a reinforcement of 3 by $1/2$ -in. bar, and light angles which serve as seat supports also add stiffness. T-posts are riveted to the plates and spaced at 2-ft. 6-in. centers. By placing the wide leg of the angle sills horizontally, ample surface is afforded for a secure connection of the crossings without the use of gusset plates. The crossings are composed of pressed steel channels 5-in. deep at the center. Diagonal braces of $2\frac{1}{2}$ -in. steel plate aid in preserving the squareness of the structure. The riser at each side of the center platform is a pressed steel Z-shaped member. A $3/16$ -in. plate, $22\frac{1}{2}$ in. wide, extends over the end sill and other members to which it is riveted and is intended to provide resistance to buckling in case of collision. The bolsters are formed of two pressed steel diaphragms riveted to 11-in. wide top and bottom plates.

In the upper structure the posts incline inwardly 4 in. on each side, necessary for clearance in subways, and are connected with an angle iron which serves as the top plate and to which a furring strip is attached and into which the roof carlines are mortised. The roof is of wood supported at each side of

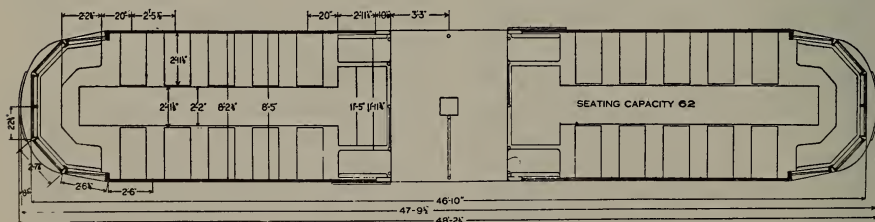


TRAIL CARS FOR BOSTON. Strain at the center is reduced by balancing each half of car on the trucks. Type of trucks, Brill 53-F

the center platform by pipe stanchions and at the ends by headers. Between the stanchions and headers is located a light steel truss.

The floor is of single thickness between seats and double thickness in the aisle of sufficient width to include the seat pedestals; the top floor in the aisle and in the center platform is composed of grooved maple. From the thresholds of the center platform the floor is ramped $1\frac{3}{4}$ in. to the center, and from the riser at each side there is a ramp of 4 in. for a distance of 4 ft. 9 in. As the floor at each end is $27\frac{7}{8}$ in. above the track, the ramps give a height from track to the threshold of $14\frac{1}{2}$ in. and height of riser $9\frac{5}{8}$ in.

A very interesting door arrangement consists of double sliding doors hung outside of the car, made to conform to the inclined shape of the sides. They are hung from an overhead track and have guides and rollers at the bottom. The upper part of the doors is glazed with plain glass and the lower with clear wire glass. Compensation for the light structure of the doors is obtained by the use of concealed reinforcing rods, three to each door and extending from top to bottom. The doors are operated pneumatically with the engine located overhead just below the side sign and the operating handles are in a specially designed standard located in the center of the platform, from which a removable railing extends



TRAIL CARS FOR BOSTON. Height from track to underside of side sills (at bolster), 2 ft. $3\frac{1}{2}$ in.; underside of side sills (at bolster) over roof, 8 ft. $6\frac{1}{2}$ in.; floor to center of carline, 8 ft. $3\frac{3}{4}$ in.; track to platform, $14\frac{1}{2}$ in.; platform to floor, $9\frac{1}{2}$ in.; weight of carbody, less electrical equipment, 15,900 lb.; electrical equipment, 300 lb.; air-brake equipment, 650 lb.; trucks, 7,800 lb.; total weight, 24,650 lb.

to a center pipe stanchion in the doorway at each side. All of the pipe stanchions have sanitary white enamel portions at the center.

At either side of the door is a stationary sash beyond which five windows have the upper sashes

ranged to raise their full height and the window openings are protected by $17\frac{3}{8}$ -in. wide wire screens having 2-in. wire mesh and pipe frames. The five windows at each end of the car have single sashes arranged to drop into covered pockets and are provided with



TRAIL CARS FOR BOSTON. The engine for the pneumatically-operated doors is located behind the sign, "Prepayment Car." The door-operating standard is not shown in the engraving, but its position is indicated in diagram on opposite page. The drop handle at center of the riser, at left, operates brake shaft, the pawl of which is in a recess in the riser

framed together in one section. The top of this continuous sash panel is held in position by a lip formed in the lower edge of the pressed steel letterboard; at the lower edge the sash panel is held by malleable iron holders bolted to the T-posts in a manner to permit removal. The lower sashes are ar-

adjusting racks to permit their being held open in three positions. All of the lower side sashes and the end windows have brass stiles and mahogany top and bottom rails.

The interior finish is of straight grained mahogany and the rafters and inside of the monitor roof are



TRAIL CARS FOR BOSTON. Above the belt line the cars are inclined inwardly 4 in. on each side for clearance in subways. Light steel trusses at each end and pipe stanchions at the center strengthen the roof

painted white. The side roofs have an agasote headlining also painted white. There are 10 cross seats and two stationary longitudinal seats on each side and a semi-circular seat at each end. The cross seats are of Brill "Winner" type and all have cherry cushions and backs stained mahogany. Hand strap rails with hand straps extend from the platform to the end of the car at each side. Push buttons are provided on each side post. At the side of the platform on the center line of the car is a

pipe stanchion which, in addition to serving as a grab handle, is used for a brake staff and operated by a drop handle. In the recess in the riser is the brake ratchet and pawl with sufficient space to permit the conductor to place his foot in the opening and release the pawl.

Brill 53-F diamond truss frame trucks are employed for all the cars and have 24-in. diameter wheels and 5-ft. wheel base. The bolster centers are 24 ft. and clearance is arranged for a 35-ft. radius curve.

*A folder has just been issued on the Brill standard
24-in. wheel pivotal motor truck.*

CRANE CAR FOR THE RHODE ISLAND COMPANY

THREE-MOTOR ELECTRIC PILLAR CRANE

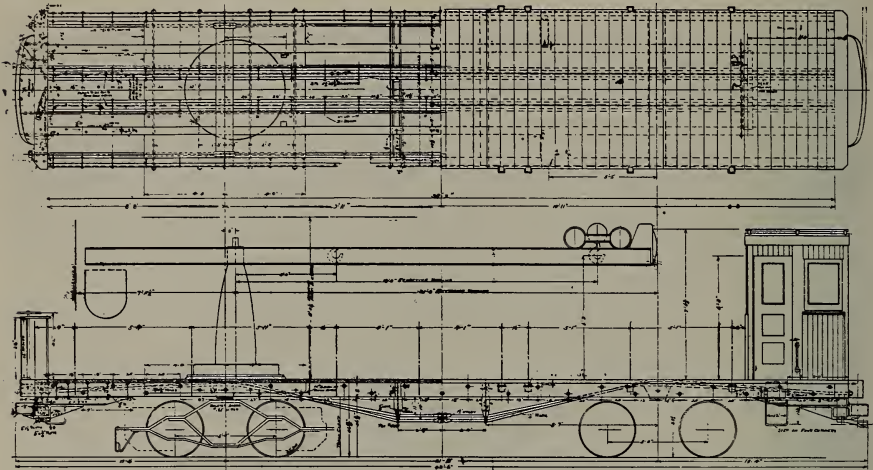
THE Rhode Island Company has lately received a double-truck crane car, built by the Wason Manufacturing Company, and intended for handling rails and special work. The crane has a maximum capacity of six tons at a 10-ft. radius and three tons at a 17-ft. 10-in. radius. It is equipped with three motors; one of 11-hp. capacity for hoisting and a speed of 8 ft. per minute, full load; a 2-hp. motor is used for the trolley travel and has a speed of 35 ft. per minute; the motor for sluing the crane is of 2-hp. capacity and operates at three-quarters of one revolution of the crane per minute. The center of the crane is located 6 in. off the center of the bolster towards the center of the car. The car is equipped with a screw jack at each corner to give the crane a

solid base when lifting heavy loads, and in addition a turnbuckle track clamp is provided to clamp the body to the rail.

The framing of the car consists of 5 by 8-in. side sills built up of 8-in. channels with long-leaf yellow pine fillers. Intermediate sills are of 5 by 8-in. yellow pine and the center sills are composed of 8-in. I-beams with yellow pine fillers. The end sills are of 8 by 8-in. oak, with end sub-sills of 9 by 10-in. oak faced with 10 by 1/4-in. steel plate; under the end sub-sills are buffers of 6 by 9 3/4-in. oak faced with 7-in. channels and secured to substantial knee castings. The sill separators over the needle beams are 3 1/2 by 8 in., and the truss rods rest on 6 by 6-in. oak fillers. The bolster brace, or filler at each end, is of 5 by 6-in. oak faced on the bottom



CRANE CAR FOR THE RHODE ISLAND COMPANY. The car will be used chiefly for handling rails and special work. Mounted on Wason Arch-Bar Trucks



CRANE CAR FOR THE RHODE ISLAND COMPANY. Length over end sills, 40 ft. 6 in.; over buffers, 42 ft. 6 in.; width over sills, 7 ft. 10 in.; extreme width over stake pockets, 8 ft. 6½ in.; height from track to underside of side sills, 3 ft. 0¾ in.; weight of body, less electrical equipment, including air-brakes, 20,000 lb.; crane, 14,000 lb.; trucks, 15,000 lb.; motors, 11,000 lb.

by 5 by ¼-in. bent steel plate. This block extends under the side sill for a distance of 3 ft. 9 in. The car is built in solid between the center sills for a distance of 4 ft. on each side of the body bolster and is tied together with 1½-in. tie rods. The bolsters are built up of 10 by 7⁄8-in. top plate and 10 by 1½-in. bottom plate with cast filler in the center, wrought iron side bearings and cast thimbles. The under truss rods bear against struts at the needle beam, are brought over cast iron saddles at the bolsters and brought through the double end sills. In addition to the needle beams and crossings,

the sills are secured together with tie rods.

At the end of the car opposite the crane is a cab 4 ft. 7 in. wide and 5 ft. 2 in. long, with a sliding door on each side. The door windows are stationary; one window at each side, two at the front and one at the rear are arranged to drop into pockets. The back of the cab below the window is protected by a steel plate flanged at the bottom and secured to the floor. The car is mounted on Wason arch-bar trucks having a 5-ft. wheel base and bolsters spaced at 21-ft. 10-in. centers. From center of bolster over bumper, 10 ft. 4 in.

The Brill files of photographs and blue prints of special purpose cars of every description are remarkably complete.

LIGHT EQUIPMENT FOR BRYAN & COLLEGE INTERURBAN RAILWAY, TEXAS

BRILL 39-E SINGLE-MOTOR TRUCKS

IN a rich agricultural region of the Brazos Valley is located one of the most enterprising and prosperous of the small cities of Texas—Bryan, with a population of 10,000. It is about 80 miles

under construction, runs west, crossing the Brazos River at Pitts-bridge, and south along the river to Wilcox.

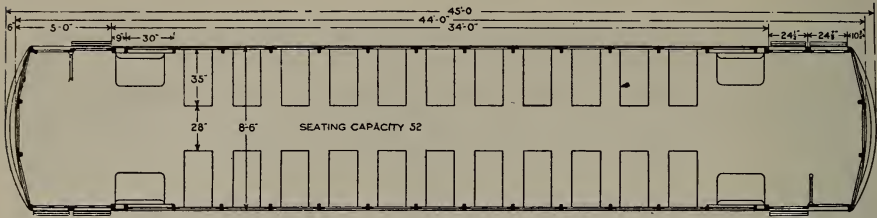
The Bryan & College Interurban Railway has been in operation for



EQUIPMENT FOR BRYAN & COLLEGE INTERURBAN RAILWAY. Light-weight interurban type with 52 seating capacity, mounted on Brill Single-Motor Truck No. 39-E

northwest of Houston, on the direct route of steam railways between that city and Waco. The city of Bryan and the neighboring region have developed to such an extent that two interurban lines have been built to supplement the steam railway service and provide frequent schedules between important points. One of these is the Bryan & College Interurban Railway, which extends south a distance of seven miles to the town of College Station, another rapidly growing community with 2,500 population at present; the other line, which is

four years, and has very materially assisted in the development of the region traversed, which has now a population of 3,000 between the terminals; including the terminals, the population tributary to the line is 15,500. About midway between Bryan and College Station is a popular amusement resort of 27 acres extent, known as Halfway Park and owned by the railway company. Formerly four gasoline-motor cars were employed, but at the beginning of this year the electrification of the line was completed and henceforth will be operated as



EQUIPMENT FOR BRYAN & COLLEGE INTERURBAN RAILWAY. Height from track to underside of side sills, 2 ft. 8 in.; underside of side sills over trolley boards, 9 ft. 2 in.; floor to center of headlining, 8 ft. 1 3/4 in.; track to step, 16 3/4 in.; risers, 11 1/2 in.

a trolley system, the company supplying its own power. A one and one-half mile extension is under construction, and further extensions are planned for the future.

The line is fairly straight and level, only two grades being encountered, both of 1 1/2 per cent., one of which is short and the other 2,000 feet long. The running time between terminals is 20 minutes, and stops are made at any point where passengers may desire to board or alight. The new type of car makes 32 trips daily, and while the larger part of the traffic is carried through, the intervening population is furnishing a rapidly increasing quota to the traffic, and the attractions of Halfway Park add considerably to the revenue from both terminals during the evening trips as well as throughout the day.

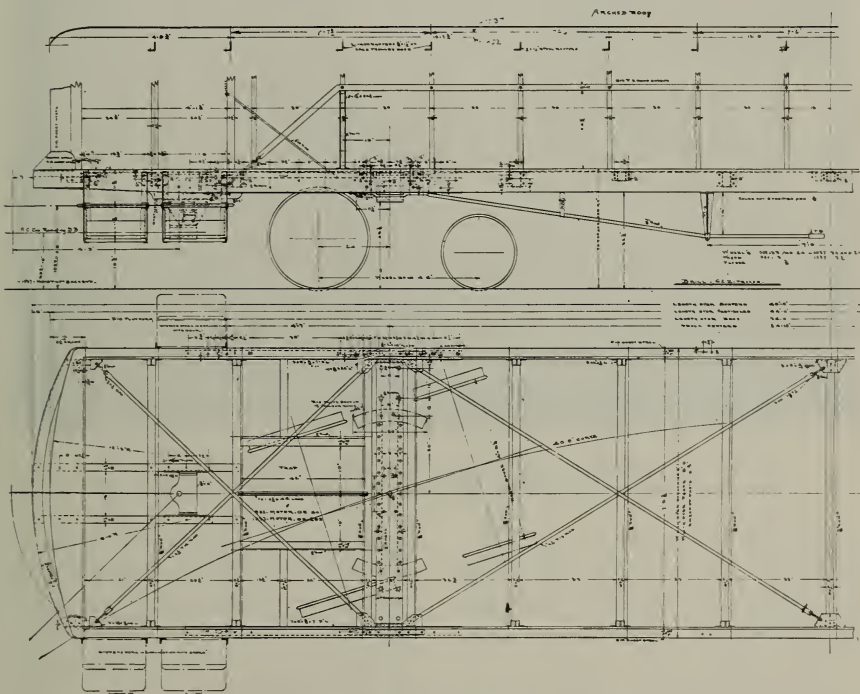
As will be seen from the accompanying illustration, the type of car recently furnished by the American Car Company is of unusually light construction for the seating capacity. The bottomframe is constructed with long-leaf yellow pine side sills, 3 1/2 by 7 3/4 in.,



EQUIPMENT FOR BRYAN & COLLEGE INTERURBAN RAILWAY. Separately-operated double set of pivoted doors at diagonal corners, operated by the conductor. Single sliding door opposite, operated by the motorman

extending from bumper to bumper and reinforced for the overhang by inside truss rods carried high on the side posts and by under truss rods bearing on 14-in. queen posts spaced 7 ft. apart. A brace rod is furnished at the door post at each corner to insure rigidity. The

side sills rest on the bolsters, and these angles are 7 ft. 9 in. long, extending well toward the ends of the car to furnish additional reinforcement where the overhang truss rods are anchored. The side sheathing is composed of sheet steel, with a slight curvature.



EQUIPMENT FOR BRYAN & COLLEGE INTERURBAN RAILWAY. The underframe is of wood, powerfully braced and reinforced with truss rods and diagonals

crossings are made of $2\frac{1}{2}$ by 5-in. oak, with tie rods at each crossing. The long diagonals shown in the diagram of the underframe consist of 1 by $\frac{1}{4}$ -in. rod adjustably secured to special brackets. Built-up bolsters made of 9 by $\frac{1}{2}$ -in. top plate and 9 by $\frac{5}{8}$ -in. bottom plate, with pressed steel fillers, are employed; angle reinforcement is provided under the side sills where the

The side posts are only $1\frac{1}{2}$ in. thick, but their lightness is compensated for in the use of a continuous bottom rail for the upper window sashes. The posts are spaced at 30-in. centers, and steel rafters from each post support the roof and are supplemented by the usual wooden carlines.

The interior is plainly but attractively finished in ash of natural



EQUIPMENT FOR BRYAN & COLLEGE INTERURBAN RAILWAY. Weight is materially reduced by omission of bulkheads and by the use of light posts reinforced with continuous upper-sash framing. Lower sashes raise their full height

color, and the seats are of Brill "Winner" type, with ash backs and seats. As has been said, the upper sashes are framed in a continuous piece, and therefore are stationary; the lower sashes are arranged to raise their full height. The end sashes are double and made to permit the upper sashes to slide down on the stationary lower sash. Five-bar hinged window guards are installed on each side of the car, and push buttons are provided on each side post. To the right of the motorman at each end of the car there is a sliding exit door with double folding steps, both operated by a simple lever system with handle convenient to the mo-

torman's position. At the opposite side of the platform at each end there is a double set of pivoted doors, each door having an individual pair of steps operated by the same mechanism; these doors are operated separately from the conductor's position, and the method of operation is shown in the illustration on page 150. Brill single-motor trucks, with the Brill Graduated Spring System, carry the carbody as low as possible on pivotal trucks having 33 in. drivers; specifically, the height from rail to top of floor is 3 ft. 4 in.; the height from rail to tread of lower step is $16\frac{3}{4}$ in., and the risers are $11\frac{7}{8}$ in.



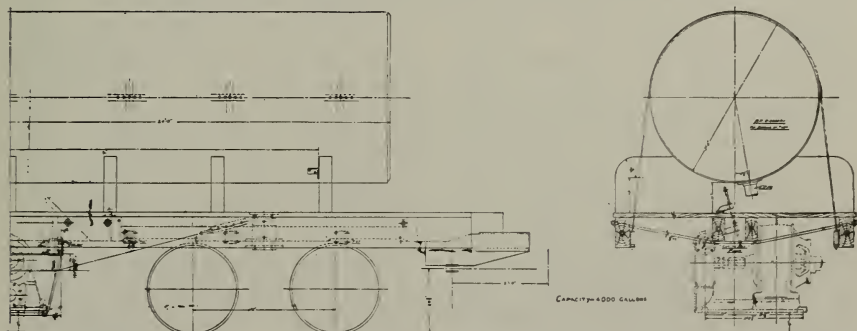
CENTRIFUGAL SPRINKLING CAR FOR SCRANTON

4000-GALLON CAPACITY

SEVERAL weeks ago the Scranton Railway Company received from The J. G. Brill Company a 4,000-gallon centrifugal sprinkling car, which is being used at present for flushing paved streets instead of sprinkling. It is operated from midnight to 5.00 a. m., or as much time between these hours as is necessary. The

company furnishes the car and crew, and the city provides the necessary hose, water and men to do the flushing. It is the only flushing car used in Scranton and is filled from the city hydrants.

The car is built on an underframe of long-leaf yellow pine side sills, $5\frac{1}{2}$ by $11\frac{3}{4}$ in. The crown pieces are of 8 by 12-in. oak, the



CENTRIFUGAL SPRINKLER FOR SCRANTON. Length over platforms, 31 ft. 0 in.; width over sills, 7 ft. 6 in.; extreme width, 7 ft. 8 in.; height from track to underside of side sills, 2 ft. 8 $\frac{3}{8}$ in.; underside of side sills over trolley boards, 7 ft. 8 in.; track to step, 24 $\frac{3}{8}$ in.; step to platform, 21 $\frac{1}{2}$ in.; weight of body, complete with trucks, electrical and air equipment, less motors, 34,100 lb.; motors, 9,540 lb.; total weight, 43,640 lb.

crossings of $3\frac{3}{4}$ by $8\frac{3}{4}$ in. oak and the stringers of $4\frac{3}{8}$ by $8\frac{3}{4}$ -in. yellow pine. Truss rods under each side sill are of $1\frac{1}{8}$ in. diameter bearing on queen posts bolted to the sills. The bolsters are composed of 9 by $\frac{5}{8}$ -in. top plate and 9 by $\frac{7}{8}$ -in. bottom plate, with cast fillers. The steel tank is 5 ft. 4 in. in diameter by 24 ft. long and has a capacity of 4,000 gallons. It is provided with four Brill patented sprinkling heads, which are adjustable for both range and quantity of water. Gate valves are provided in each pipe line back of the sprinkling heads to enable the

water to be cut off without disturbing the sprinkling head adjustment. On each of the pipes back of the gate valves a special valve is located, to which hose may be coupled for flushing purposes.

The centrifugal pump is located under the center of the car and furnishes pressure to permit four lines of flushing hose to be used at the same time. The car is mounted upon Brill 50-E2 diamond-frame trucks and equipped with both hand and air brakes. The drawbars, angle-iron bumpers, platform gongs, brake hangers, etc., are of Brill manufacture.

SEMI-STEEL PASSENGER AND BAGGAGE CAR FOR KANSAS-OKLAHOMA TRACTION COMPANY

BRILL 27-MCB2X TRUCKS

THE Kansas-Oklahoma Traction Company has lately put in operation on a new portion of its system the type of car illustrated, which was furnished by the American Car Company. For a number of years the company has been extending its system from Coffeyville, in the southeastern part of Kansas and close to the Oklahoma border, and early in 1913 commenced through operation to Parsons, 50 miles north. On this road are Independence and Cherrydale, and, like Coffeyville and Parsons, are the converging points of several large trunk lines which do a heavy grain and stock business in this fertile and prosperous region. The same character of country

stretches southward in Oklahoma along the Verdigris River, and it is in this section that the new line has been built, reaching Nowata, about 40 miles to the south.

The bottomframing of this type of car is of all-steel construction, with the side sills composed of angles and 12 by $\frac{3}{8}$ -in. plates. The center and intermediate sills are of 6-in. I-beams, extending from bumper to bumper, and the crossings are of 5-in. channels. Two 8-in. I-beam needle beams form the bearing for the queen posts of the undertrusses. Upper truss rods reinforce the ends of the car and are brought up on supports directly over the bolsters and extend along under the window rails. The cor-



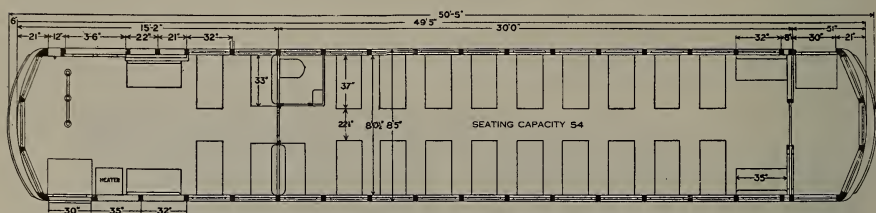
COMBINATION CAR FOR KANSAS OKLAHOMA TRACTION. In addition to the steel under-frame and post construction, this type is sheathed with steel. Undertrusses at diagonally-opposite corners. Mounted on Brill 27-MCB2X Trucks

ner posts are built up to 8 in. thickness, and the side posts are $2\frac{1}{4}$ in. thick. A sheathing of No. 14 sheet steel covers the sides and ends, the side sheathing being applied in panels to facilitate replacement should any panel meet with injury. The flooring is double,

with heavy building felt placed between the top and bottom layers, and a depression is provided at the center for the regulation floor strips. The Brill plain arch roof is supported on $\frac{5}{8}$ -in. steel rafters, together with the usual wooden carlines. Eight Brill "Exhaust"



COMBINATION CAR FOR KANSAS-OKLAHOMA TRACTION. The center and intermediate sills are composed of I-beams and the side sills of angles with 12-in. sill plates



COMBINATION CAR FOR KANSAS-OKLAHOMA TRACTION. Height from track to underside of side sills, 3 ft. 5½ in.; underside of side sills over trolley boards, 9 ft. 2½ in.; floor to center of headlining, 7 ft. 11¼ in.; track to step, 15½ in.; risers, 11¼ in.

ventilators are set in the roof, four on each side of the trolley boards, which boards have a clearance of 2¼ in. above the roof. Angle-iron bumpers of the Brill type, faced with Hedley anti-climber section and surmounted with steel bumper shields, strengthen and protect each end. Angle-iron pilots are installed and arranged to give

ample space for M. C. B. radial drawbars.

As will be seen in the diagram of the floor plan, the smoking compartment is arranged to accommodate baggage. The baggage is handled through a door at the right of the motorman, which is of the sliding type. This door has a 4-ft. opening, and a screen sliding door



COMBINATION CAR FOR KANSAS-OKLAHOMA TRACTION. The baggage and smoking compartment has a seating capacity of 12, including two folding longitudinal seats



COMBINATION CAR FOR KANSAS-OKLAHOMA TRACTION. The interior is finished in quartered oak, and there is a sheet-steel lining below the window sills. Six Brill "Exhaust" ventilators in main compartment and two in baggage and smoking compartment

is also furnished for use in summer. Opposite the baggage door is a swing door, with floor trap covering a triple step. A pipe partition back of the motorman's position prevents encroachment of baggage upon his space, and folding seats increase the baggage space if necessary. A swing door gives access from the smoking compartment to the main compartment; against this partition a toilet room is installed and provided with the standard appointments. A single sliding door in the bulkhead opens upon the vestibule, which has a swing door and triple step with floor trap, the same as at the diag-

onal corner of the car, and opposite to which the vestibule is solidly paneled.

Each side of the car has 12 double sash windows, the top sash stationary and framed with a continuous bottom rail; the lower sashes are arranged to raise their full height. Three sashes are provided in the ends, with the top side sashes stationary and the lower arranged to raise, while the center sash is single and arranged to drop. The trucks are of the Brill 27-MCB 2X type, capable of a speed of 50 miles per hour, and equipped with 60-hp. capacity motors, four per car.

SUGGESTIVE SUBJECTS

NOTE.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

SELF-RESPECT

ANY man who thinks he is undervalued should get busy at once and find out why he is ignored or misunderstood. It is vitally important that he investigate the matter thoroughly.

But he can't begin the investigation without knowing where the trouble lies. And if he can't realize that it lies entirely within himself, he will have to drop it and take the valuation that is put upon him.

If he will admit to himself that he must be at fault and start in earnestly to find out what is needed to set himself right, and then begin at once to correct the difficulties and supply the deficiencies, he will succeed—he is bound to succeed.

First, he must take stock of himself. His conduct must be examined to see where self-respect is being lowered, and a halt called at once on any habit of thought, speech or action that is worthless or degrading.

If he is lazy, he must drive himself into the habit of continuous application to his job.

If an honest analysis of his brain shows a slow and weak grasp of daily problems, then the reasoning faculties must be sharpened up by some kind of practical study.

He must take account of his appearance—of cleanliness and neatness; of how he carries himself—that he stands or sits as if he had a backbone.

Slovenliness in speech, as well as bearing, must be overcome and replaced with a courteous and businesslike directness.

Above all, he must make sure that he is entirely honest with himself—that he will look facts straight in the face and never fool himself by taking for granted that things somehow or other will turn out to his advantage, or at least do him no great harm.

No man with the genuine brand of self-respect will be undervalued. Self-respect is registered plainly on every man who possesses it, and always impels respect.

AMUSEMENT PARK ADVERTISEMENTS

NO one who has ever been to —— Park is at a loss to know where to go to have a good time.

The healthiest, happiest hours are those spent out-of-doors. Go to —— Park and come back refreshed and invigorated.

—— Park is for everybody's enjoyment, from the youngest to the oldest. Go and get your share of the pleasure.

The attractions of —— Park speak for themselves! They tell you to come and be amused and interested! They also tell you to come again!

Plenty of fresh air, bright music, good dancing, fine boating and all sorts of wholesome recreation at —— Park.

If you need rest and relaxation, or if you need exercise and livening up, you will find just what you need at —— Park.

The real recreation spot within the horizon of your every-day life is —— Park.

The right thing to take for the blues, a dull feeling or a headache, is a trolley car that will land you at —— Park.

There is no place where you can get so much pleasure for so little money as at —— Park. And it is the kind of pleasure that does you good!

The most popular park, the park which pleases particular people, the park with plenty of places for parties and picnics, the park that has all parts properly protected against possible danger to little patrons, the park par excellence is —— Park.

For genuine pleasure go to —— Park. Breathe deeply, smile broadly, laugh heartily! Feast your eyes on the gay and beautiful. Take your fill of good, healthy fun! Be young and happy at any age! Today, this evening, go to —— Park.

A comfortable, breezy, interesting ride to the most attractive place in the vicinity; a place that is splendidly prepared to give you thrills of pleasure at every turn; that is full of spontaneous gaiety and life, genuine amusement and recreation— —— Park.

Cool groves and sunny lawns, brilliant flowers and sky-blue water, gay pavilions and bright music, rippling laughter and gleeful shouts, a whirl of life in many places, quiet nooks a plenty, a sound of oars and singing from the lake—that is —— Park.

The following are reprinted by request from BRILL MAGAZINE of February and July, 1914:

DEPENDABILITY

TO BE dependable—to be singled out as one who accomplishes things—is a tremendous asset.

A man may be faithful or industrious, or even capable, and still not be dependable.

For the faithful man may be incompetent, he who is capable may possess erratic tendencies which minimize his efforts, and the industrious man may be a blunderer.

But the dependable man is he who can at all times be depended upon to do that which is set for him to do as it should be done.

He has learned by experience how not to do things, and with this has come naturally the knowledge of how things should be done.

Like every other quality, dependability can be acquired. Like everything else that is desirable, its acquisition requires effort. But the reward is worth the struggle.

DIRECTNESS

DIRECTNESS, in the manner in which it is used here, means the ability to get to the point at once, state it in as few and forceful words as possible, stick to it until it is disposed of, and then drop it.

It is an extremely valuable attribute, and one which more men would do well to acquire. It can be acquired.

The man who possesses it can always get a hearing, can usually carry his point and can always command the respect and, generally, the admiration of those with whom he does business.

For the successful man of today has little time to listen to mere words and polished phrases.

His minutes are worth money, and the man who consumes the fewest of them is his kindest friend.

CHANGES OF ADDRESS

THOSE who receive BRILL MAGAZINE are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.



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COLONY—Thomas Barlow & Sons, Durban, Natal

CHINA—Shewan, Tomes & Co., Hong Kong, Can-
ton, Shanghai

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BRILL STATIONARY-BACK SEAT

WHILE this seat weighs only thirty-five pounds, no strength has been sacrificed in the construction. Pressed-steel one-piece pedestal, back and cushion support as shown in the illustration, and no cross frames, account for the reduction of weight.

THE J. G. BRILL COMPANY, PHILADELPHIA

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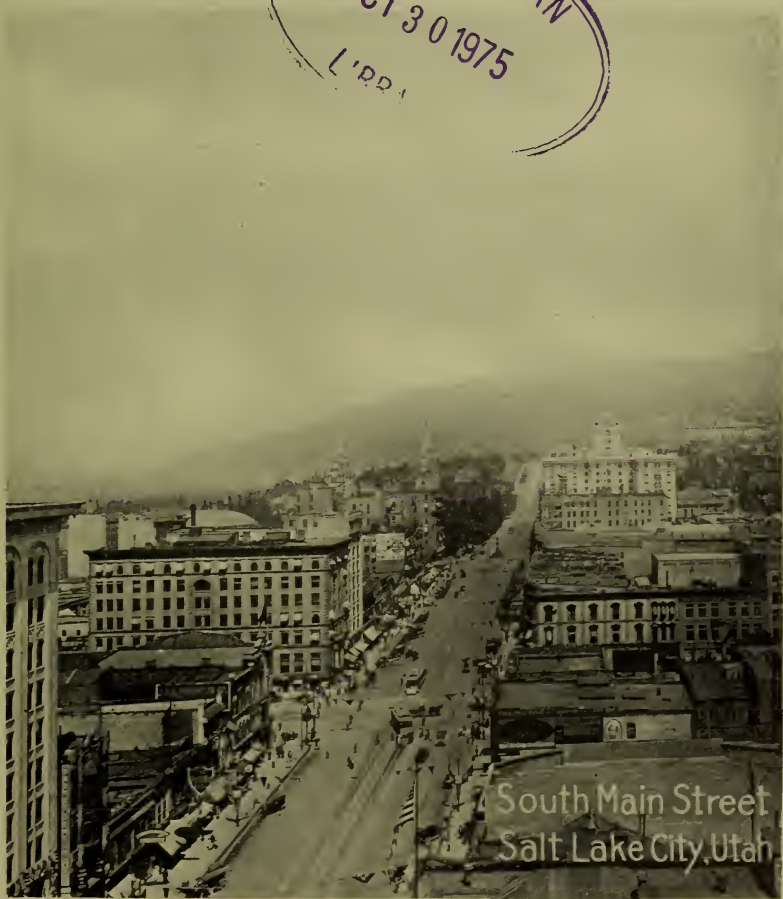
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No. 6

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“HALF-BALL” BRAKE HANGER

BOLTS at the top and bottom of the Brill “Half-Ball” Brake Hanger keep the springs under compression; they have a loose fit in the half-ball ends of the hangers and in the socket castings to allow a slight lateral play and enable the shoe to wear uniformly. The case-hardened wearing parts give the hanger a long life free from any attention whatever. It is absolutely noiseless, because it is self-adjusting for wear and it is self-cleaning.



Samuel L. Roberts

GENERAL MANAGER, SANTIAGO LIGHT & TRACTION COMPANY

Resourcefulness

Overcoming handicaps—surmounting obstacles—turning mishaps to account—finding a way to do a thing and doing it in the face of difficulty and opposition—that is resourcefulness.

The man who possesses it will succeed where the average man, tho' he be equally able, may fail.

Resourcefulness has bridged rivers and tunnelled mountains. It dug the Panama Canal and will eventually render it obsolete.

The resourceful man will never admit that a thing cannot be done. If he be ambitious and enterprising, as well as resourceful, he will go ahead and do the thing while others are questioning its practicability.

Obstacles, difficulties, accidents, opposition—to the resourceful man, these are merely clods on the path of progress—things to be brushed aside.

If he can't brush them aside, he will go over or under or through them.

JUNE 15, 1915

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EMILIO S. GODOY

EMILIO S. GODOY, General Manager of the Santiago Light & Traction Company, Cuba, was born in Santiago in 1872. He graduated from the Institute of Havana in 1889, and two years later entered the street railway field as manager of the city system of Lima, Peru. He projected the first electric railway in Peru, a 20-mile inter-urban line from Lima to Chorrillos and managed its construction in 1904. He undertook, soon after, the electrification of the Lima system, comprising about 20 miles of track, and completed the work in 1906. He was one of the organizers of the Empresas Electricas Asociadas of Lima, which was founded in 1906, and served on the Board of Managers till 1913, when he accepted the appointment of General Manager of the Santiago system.

INTERURBAN CENTERS AND INTERURBAN CARS

SALT LAKE CITY

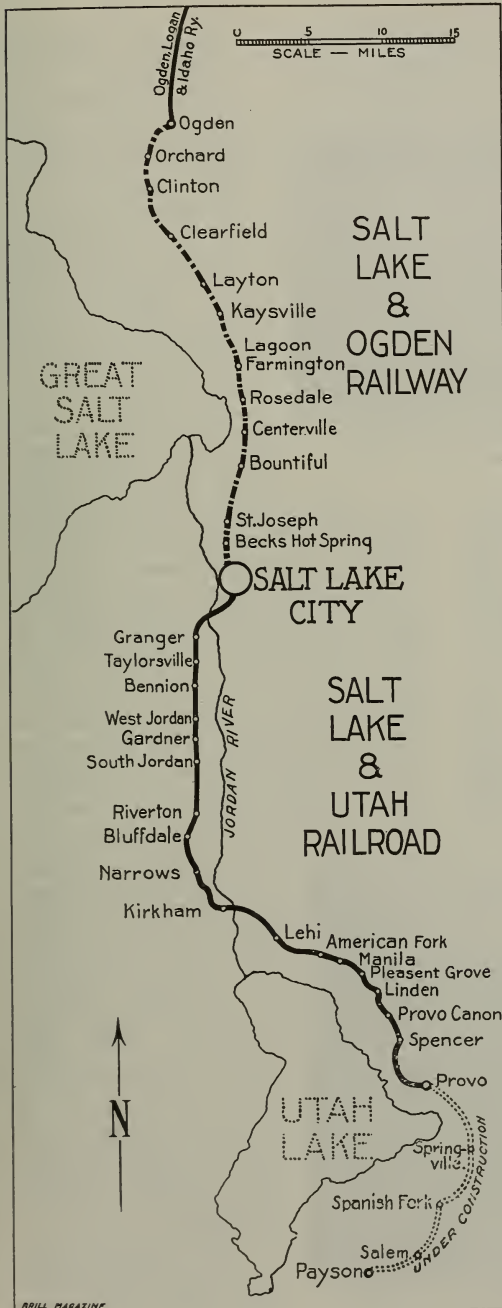
THE State of Utah is for the most part covered by great mountain ranges and vast deserts, and it is only in the northern part, along the eastern shores of Great Salt Lake, and stretching north into Idaho and south along the Jordan River and west side of Utah Lake, that a large section of cultivatable land is found. This section is in the basin of what was formerly an enormous lake, whose waters were 1,000 feet above the level of Great Salt Lake. The eastern margin of the basin is the Wasatch Mountain Range, which extends northward from the center of the State to the center of its northern border, leaving a margin of

fairly level land along the Great Salt Lake, and forming wide valleys to the north and south. The western face of the Wasatch Mountains rises abruptly from the level of the basin to a height of from four to six thousand feet, and from the sides issue many streams and rivers which furnish water for the vast network of irrigation canals which have transformed the region into a land of orchards and gardens. At many points in the mountains are important mining operations, which, with agriculture, form the principal industries of this portion of the State.

On a high, level plateau a few miles east of Great Salt Lake



INTERURBAN CENTERS AND CARS. The central part of the business district of Salt Lake City. The street railway system is operated by the Utah Light & Railway Company



stands Salt Lake City, a splendid modern city, with a population of 126,068, the metropolis of the State, as well as its capital. All of the transcontinental lines which cross the State converge at Salt Lake City, and here all of the steam lines within the State meet. The Utah Light & Railway Company controls and operates the street-car lines of the city, and also lines which reach the nearby towns of Murray, Sandy, Midvale, Bountiful, Centerville and Holliday. A description of the latest 56-passenger steel cars for the suburban service was published in the September, 1914, issue of BRILL MAGAZINE.

The Salt Lake & Ogden Railway, also known as the Bamberger System, because of its founder, was commenced about 20 years ago, and the first section opened was but five miles long and reached Beck's Hot Springs. Later the road was extended ten miles further north to Lagoon, where a beautiful artificial park was developed, and is today one of the most attractive and popular railway amusement parks in the country. This point remained the northern terminus of the line for several years, and in 1910 the company completed the road to Ogden and commenced operation over a main line 35½



INTERURBAN CENTERS AND CARS. Plate girder bridge of the Salt Lake & Ogden Railway Company crossing Weber River and highway bridge

miles long. Double tracks and sidings bring the trackage up to 66 miles. The route parallels the main lines of two steam railway systems, but its location makes it more accessible to the farmers of the fertile belt traversed.

Outside of the cities the company operates on its own right-of-way, which has a standard width of 66 feet. Of the $35\frac{1}{2}$ miles of

main line, 20.2 miles are double tracked, and the double-tracking of the balance is now in course of construction. The maximum grade is 1.01 per cent., and the maximum curvature outside of the cities is 6 degrees. The roadbed is ballasted with gravel and the track laid with 85-lb. T-rail. Bridges crossing rivers, steam railway lines and city

tracks are of both truss and plate girder construction on concrete abutments. There are eleven towns between Salt Lake City and Ogden given on the time table, of which Bountiful, Farmington and Kayesville are the principal points. Including the terminal cities, the tributary population of the system totals 170,000. The city of Ogden, the northern terminus of the sys-

tem, has a population of 32,000, and is second only to Salt Lake City in size and commercial importance. The southern terminus of the Ogden, Logan & Utah Railway is here, and the terminal station, recently constructed, is also shared by the Salt Lake & Ogden Railway.

The passenger service of the Salt Lake & Ogden Railway



INTERURBAN CENTERS AND CARS. A long cut on the Salt Lake & Ogden lines. The maximum grade of the system is 1.01 per cent

consists of 18 through trains in each direction, which make all stops, and 8 trains which run from Salt Lake City to either Lagoon or Kayesville. This gives an hourly through service, and a train every half hour to Lagoon or to Kayesville. The cars are run singly or in trains, as traffic demands, and are all equipped with multiple-unit control.

During the winter the number of passenger cars used in normal operation is 12, and 28 in summer; the total number of passenger cars available is 40. The cars are run at a maximum speed of 55 miles per hour; the limiteds average one stop to every 4 miles, and the locals average one stop to every mile.

In addition to passenger traffic, the company handles baggage and express, milk and general freight business; in the latter, material is handled both in carload and less than carload lots. The lines are connected with the Union Pacific at Ogden, and with the Denver & Rio Grande and the Oregon Short Line at Salt Lake City, for the transfer of freight cars. For the year 1914 the Salt Lake & Ogden



INTERURBAN CENTERS AND CARS. Bridge and fill on the Salt Lake & Ogden lines near Ogden

Railway Company traffic statistics show a passenger car mileage of 1,028,880, and a ton mileage of freight of 37,499,346.

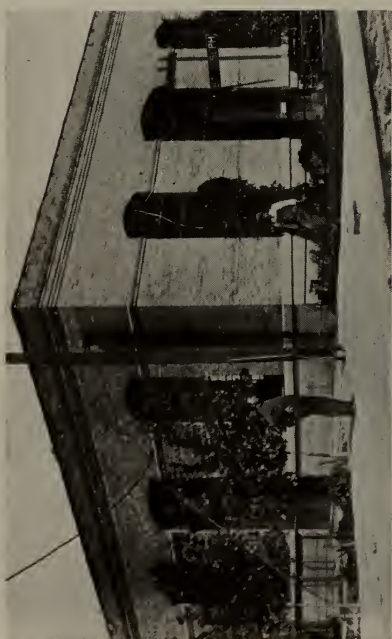
The standard car of the system is shown on page 167, and has a seating capacity of 62. The length over buffers is 56 ft.; length over vestibules, 55 ft. 2 in.; width over all, 9 ft.; wheel base of trucks, 6 ft. 6 in. The underframe is built en-



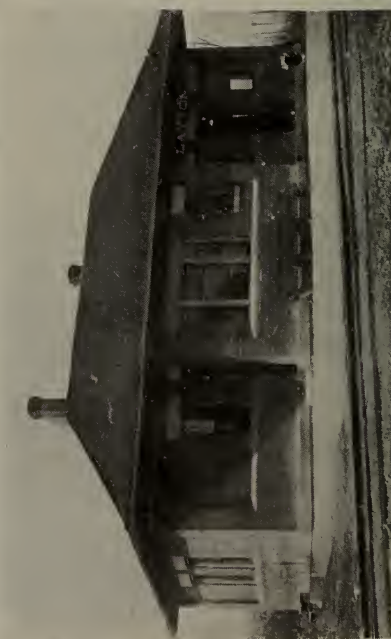
INTERURBAN CENTERS AND CARS. Typical concrete non-agency station of the Salt Lake & Ogden Railway



Interurban terminal at Ogden, shared with
the Ogden, Logan & Idaho Railway
Station at Bountiful



One of the four sub-stations of
the Salt Lake & Ogden Railway
Station at Layton





INTERURBAN CENTERS AND CARS. Standard single-end three-compartment car of the Salt Lake & Ogden Railway. Length over vestibules, 53 ft. 2 in.; seating capacity, 62. All-steel underframe.

tirely of steel, and includes 8-in. I-beam center sills, 8-in. channel side sills and intermediate sills and channel crossings. The baggage compartment is 11 ft. long and has sliding doors at each side; two folding seats are placed along the side walls. The smoking compartment seats 16, and the main compartment 44. The cars are built for

single-end operation, but are equipped with double-end control. They are operated at 720 volts d. c., and are equipped with four 125-hp. interpole motors. The multiple unit control is of the automatic acceleration type.

The freight trains of the system are handled by two 40-ton locomotives, each equipped with four 125-



INTERURBAN CENTERS AND CARS. Interior of the above car. Main compartment has 15 reversible and 4 stationary-back seats; smoking compartment, 4 reversible and 4 stationary seats; baggage compartment, 2 folding seats



INTERURBAN CENTERS AND CARS. Two of these 40-ton locomotives haul the freight trains of the system

hp. motors. A 20-ton line and work car is equipped with two 125-hp. motors.

The territory south of Salt Lake City is served by the Salt Lake & Utah Railroad, which extends along the west bank of the Jordan River

and eastern shore of Utah Lake to Provo, a distance of 481½ miles. The system is popularly known as the Orem Lines, after the founders. The lines are being extended 8 miles further south to Springville, and within the next year will



INTERURBAN CENTERS AND CARS. Line and work car of the Salt Lake & Ogden Railway

be pushed on through Spanish Fork and Salem to Payson. This will make the system nearly 70 miles long. The lines commenced operation in July, 1914, just 16 months after construction work had been started. The company owns all the right of way over

many of which have been heretofore without direct railway connection with either of the present terminals of the road. On either side of the lines there is an uninterrupted view of the mountains, and the views of Utah Lake are remarkably fine. The grades are slight,



INTERURBAN CENTERS AND CARS. View from the Salt Lake & Utah Railroad north of Provo. Mount Timpanogas forms the background of the scene on this side of the lines, and on the other side is beautiful Utah Lake, with mountains beyond

which it operates, except the portions within incorporated towns. The population of Provo is 10,000, and that of American Fork and Lehi about 4,000 each. The population of towns between the terminals totals about 16,400; including the terminals, it is estimated that the tributary population of the system is 141,400.

There are 32 scheduled stops between Salt Lake City and Provo,

with a maximum of 1.5 per cent.; the curves are for the most part light, although at one point in Jordan Narrows it was necessary to use a 7-degree curve. The line is ballasted with gravel and the rails are 75-lb. section, with 60-lb. for the sidings. There are many bridges over irrigation canals, which are built of pile trestles, and the same construction is used over two crossings of the Jordan River; the Provo



INTERURBAN CENTERS AND CARS. Salt Lake & Utah lines near American Fork. A few miles from here the lines follow the Jordan River through a gap in the mountains



INTERURBAN CENTERS AND CARS. Trestle over the Jordan River, on the lines of the Salt Lake & Utah north of Lehi. Steam railway bridge at the right

River is crossed by a plate girder bridge. A half-mile frame and pile trestle, with an 80-ft. timber Howe truss, crosses the Denver & Rio Grande Railroad just south of Salt Lake City; it is intended to fill this trestle later. At another point a reinforced concrete under-grade crossing of the same railroad

received at the substations at 44,000 volts, 60 cycles, and transformed for use at 1,500 volts d.c.

The lines at present are equipped with 12 steel cars, of which 9 are used in normal operation and are run at a maximum speed of 55 miles per hour. The stops average one to seven-tenths of a mile. The

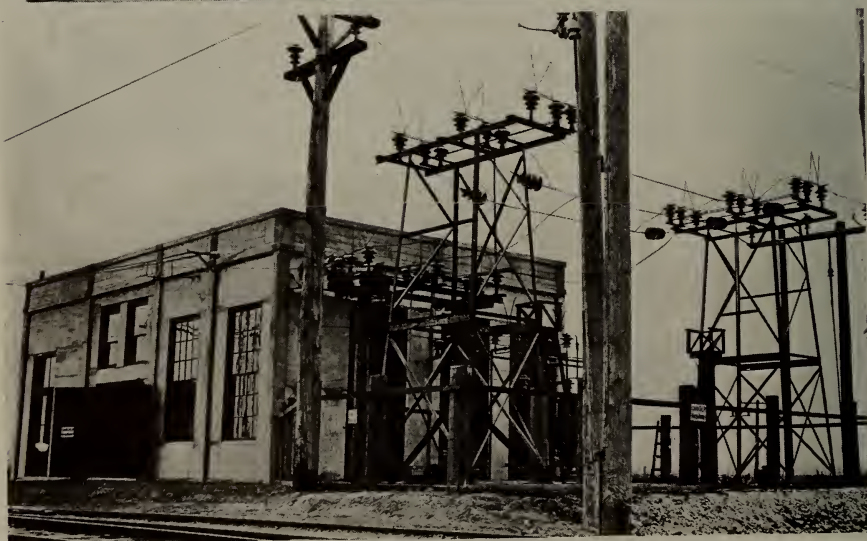


INTERURBAN CENTERS AND CARS. Business corner in Provo, the present southern terminus of the Salt Lake & Utah. The lines are being extended to Payson, 17 miles further south

is made. At branch-line grade-crossings are installed interlocking crossing signal plants with semaphore signals and derails, and at obscure highway crossings at grade automatic crossing signals with swinging arms and red lights are employed.

The overhead construction is of catenary type of latest design, with five-point suspension under standard spans of 150 feet. Current is

cars are 59 ft. 8 in. over vestibules and 9 ft. 6 in. over the side sheathing. They are equipped for double-end operation, and have a 11-ft. 9-in. baggage compartment at one end, and the smoking and main compartments seating 66 passengers. Entrance is at the end opposite the baggage compartment, and triple steps, with trap doors, are on both sides. The trucks have a wheel base of 7 ft., and are spaced



INTERURBAN CENTERS AND CARS. Typical passenger and freight station, concrete non-agency station, and sub-station of the Salt Lake & Utah System



INTERURBAN CENTERS AND CARS. Standard three-compartment steel car of the Salt Lake & Utah Railroad. Length over vestibules, 59 ft. 8 in.; seating capacity, 66

at 36-ft. bolster centers. The control is of the multiple-unit type, and the motors, four per car, are of 115 hp. capacity each. Weight of car and trucks, fully equipped, 85,892 lb.

Additional equipment consists of two 50-ft. all-steel express cars and an all-steel work car, with the same motor equipment as the passenger cars, but geared for lower speeds; 7 wooden box cars, 20 steel gon-

dolas, 8 wooden flat cars, 1 locomotive crane, 1 steam locomotive and 10 convertible ballast cars.

The Emigration Canyon Railroad Company operates a line east from Salt Lake City to the head of Emigration Canyon, a distance of 14 miles. The canyon gets its name from being the old overland trail to California. The line was built primarily for the transportation of lime and sandstone to Salt



INTERURBAN CENTERS AND CARS. Interior of the above car. Main compartment has 17 reversible and 4 stationary-back seats; smoking compartment, 4 reversible and 4 stationary seats; baggage compartment, 2 longitudinal seats



INTERURBAN CENTERS AND CARS. Two of these 50-ft. steel cars are employed in express service

Lake City for building and smelting purposes, but because of its scenic attractions and desirable location for summer homes it was equipped with overhead trolley about 7 years ago, and has proved a very successful undertaking, especially in its summer and tourist traffic. The line rises 2,800 feet in 14 miles, bringing it to a point 7,000 feet above sea level. The larger cars seat 52 passengers, and have extra large windows of the Brill "Washingeon" type. They have 34-ft. bodies, and are 43 ft. 6 in. long over vestibules; width over side sheathing, 8 ft. 3½ in.

The company also operates what are known as "Moonlight" trail cars, which have a seating capacity of 52, and are covered with a canvas canopy supported on pipe framing. The length over the dashers is 40 ft. 6 in. Closed trailers are also employed, which have a wide center entrance on one

side, and are equipped with transverse seats seating 48 passengers. They measure 37 ft. 0¾ in. over the ends and the car body, equipped with hand and air brakes, weighs only 9,000 lb. The cars of the Emigration Canyon Railway were described and illustrated in BRILL MAGAZINE of June, 1909, and July, 1911.

This region of Utah, north and south of Salt Lake City, served by the Salt Lake & Ogden Railway and the Salt Lake & Utah Railroad, although marvelously developed within a comparatively short period, is looking forward to an even greater growth in the near future, owing to the opening of the Panama Canal, the extension of irrigation systems and other important factors, and the general growth of the country will doubtless call for a large expansion of the interurban systems which have immensely aided in producing its prosperity.

STEEL INTERURBAN TYPE FOR THE CLEVELAND & EASTERN TRACTION COMPANY

BRILL 27-MCB2X TRUCKS

THE car illustrated has just been completed by the G. C. Kuhlman Car Company for the Cleveland & Eastern Traction Company, and embodies the latest details adopted in steel interurban design.

The Cleveland & Eastern Traction Company's lines extend east from Cleveland to Middlefield, with a branch to Chardon, a town of 1,400 population. The land in this region is somewhat hilly, but lends itself to general farming, which is the principal industry, and supports a population tributary to the lines of 15,500. The new car will be operated between the interurban terminal at the Public Square of Cleveland and Chardon, a run of 32 miles, and will make an average number of stops of four per mile. The maximum grade encountered is 11 per cent., and the running time for the round trip is two hours.

In designing the car the utmost attention was given to the elimination of all unnecessary weight, and, in view of the fact that no sacrifice of strength or omission of equipment for obtaining the most efficient and safe operation was made.



STEEL INTERURBAN TYPE FOR CLEVELAND & EASTERN. Front end of car, showing location of motorman's door. Glazed upper part of door and four large windows give wide outlook



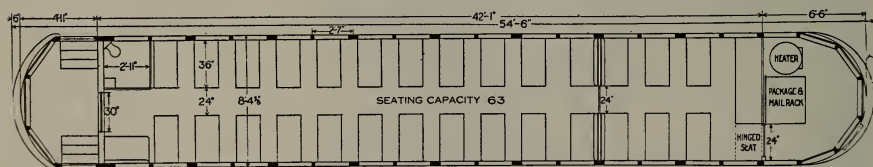
STEEL INTERURBAN TYPE FOR CLEVELAND & EASTERN. Each side forms a steel girder, from the top plate to the sill, of which the principal member is the continuous side plate. The car is mounted on Brill 27-MCB2X Trucks

the result is extremely interesting, as is shown in the following table, in which for comparative purposes is included a table of dimensions and weights published in a recent issue of the *Electric Railway Journal*:

	Cleve. & East.	Fostoria
Over-all length.	54 ft. 6 in.	56 ft. 9½ in.
Over-all width .	8 ft. 6 in.	8 ft. 6½ in.
Weight of body	23,186 lb.	29,550 lb.
Wt. of trucks		
and equipment	36,214 lb.	38,450 lb.
Total weight ..	59,400 lb.	68,000 lb.
	Union Trac.	Chicago
Over-all length.	61 ft. 0 in.	48 ft. 0 in.
Over-all width .	8 ft. 0½ in.	8 ft. 8⅜ in.
Weight of body	45,200 lb.	35,600 lb.
Wt. of trucks		
and equipment	40,400 lb.	34,900 lb.
Total weight...	85,600 lb.	70,500 lb.

The underframe is composed of angle side sills with eleven light I-beam crossings between the bolsters; the end sills are made in the

form of a trussed frame, with angles at the top and channels at the bottom. Diagonals at each end are arranged to serve as center knees, and are brought well back of the bolster; they are strongly reinforced with angle gussets at the trussed end sills. A powerful construction for the attachment of the drawbars and anchors consists of angles and plates riveted to I-beams extending from the bolster to the end sill. The bolsters are made up of pressed steel diaphragms with 10-in. top and bottom members. At the rear platform the outside knees are omitted to provide an opening for the steps, and the angle forming the roof framing and the angle at the top chord of the side frame extend through to the corner post and aid



STEEL INTERURBAN TYPE FOR CLEVELAND & EASTERN. Height from track to underside of side sills, 3 ft. 3 in.; underside of side sills over trolley boards, 8 ft. 11½ in.; floor to center of headlining, 8 ft. 0 in.; track to step, 15 in.; risers, 10½ in.; weight of body, 23,186 lb.; heater and miscellaneous equipment, 3,422 lb.; weight of electrical equipment, 2,380 lb.; air-brake equipment, 2,812 lb.; trucks, 16,120 lb.; motors (and gears), 11,480 lb.; total weight, 59,400 lb.

to support the outer portion of the platform by means of structural steel connections.

Each side of the car, from the side sill of the underframe to the top plate, is constructed to form a girder, of which the principal member is a continuous plate of

the bottom of the top sash, and which is dadoed over each side post.

The roof framing consists of an angle on each side, with the horizontal web turned in, and steel carlines riveted to the vertical web. Wooden nailing strips are bolted to



STEEL INTERURBAN TYPE FOR CLEVELAND & EASTERN. Looking forward in the main compartment. Both main and smoking compartments are furnished with Brill stationary-back seats

steel riveted to the side sill angle, steel belt rail and the posts. The posts are of tee-section, and are alternately single and double, on account of the twin-window arrangement. The top chord of the girder consists of an angle riveted to all post heads. Additional stiffness is imparted to the girder by means of a continuous sash rail at

the carlines, and canvas nailing strips are bolted to the angle roof sills. After the roof was placed on the carbody, the side angles were riveted to the angle top chord of the side girder.

The front and rear vestibules are framed alike; the sheathing around the front end is of the same thickness as the side plates, while at the

rear end it is composed of No. 14 sheet steel. The letter panels are made of sheet steel, and continue in line with the side letter panels.

There is a double flooring, the bottom of which is of yellow pine and the top of maple, except at the aisle, where interlocking tiling extends the full length of the carbody proper. The tops of the trap doors over the steps and the floor between the steps on the rear platform are also covered with interlocking tiling, cemented to maple flooring.

The headlinings are composed of sheet steel and installed in a continuous piece from the curtain box moulding on one side to the same

point on the opposite side, and are the length of two windows, except at the center, where they are cut to suit the partition. The only longitudinal mouldings are the curtain box moulding and the advertising moulding, and the moulding covering the joints of the headlining; the latter are painted the same color as the headlining.

The lower side sashes have brass sash stiles, and are capable of being raised their full height. The upper sashes, as has been already stated, are made in a continuous section and are glazed with pressed prism Gothic glass. An interesting feature of the windows is a novel type of window guard,



STEEL INTERURBAN TYPE FOR CLEVELAND & EASTERN. Main compartment, looking toward the rear. The novel form of window guard employed is a Kuhlman device. It is attached to the lower sash and slides in and out of a side wall pocket



STEEL INTERURBAN TYPE FOR CLEVELAND & EASTERN. Motorman's compartment, showing location of controlling apparatus, package and mail cage, and heater

which is made of strongly framed diamond mesh wire screens. The window guards are attached to the bottom of the lower sashes and slide into pockets in the side walls when the sashes are lowered. When a sash with its screen guard is raised, the lower part of the screen guard covers the pocket opening, and thus prevents rubbish from being forced into the pocket. The inside lining below the windows consists of sheet steel.

The partitions between the motorman's compartment and smoking compartment, and between the smoking compartment and main compartment are of African mahogany; they are glazed in the

upper part, and have single sliding doors. On the left side of the car, next to the rear platform, is a toilet room with standard appointments and with a flooring consisting of a single slab of marble. All of the seats are placed transversely, with the exception of the one opposite the toilet room. The type used is a non-reversible, light-weight seat, made without seat rails and having the pedestal and seat back support of pressed steel in one piece, and the wall plate pressed in one piece to form the back support at the wall end. All of the seats are upholstered in twill-woven rattan, and are of Brill manufacture. In the

(Continued on page 190)

LIGHT INTERURBAN CARS FOR SHORE LINE ELECTRIC BRILL SEMI-CONVERTIBLE TYPE

TEN cars of the type illustrated have just been delivered to the Shore Line Electric Railway Company, of Norwich, Connecticut, by the Wason Manufacturing Company, and are in service on the lines between New London and Willimantic. The Shore Line Electric System is the central link of the 267-mile trolley connection between New York and Boston across southern New England. The western terminus of the company's system is at New Haven, from whence the lines extend along the shore of Long Island Sound to New London and northward through Norwich to Webster. Half way between Norwich and Webster the line branches to Elliott, where it connects with a line to Providence and Boston. From New London to Westerly along the Long Island Sound shore and from Norwich to Westerly, with branches extending in several di-

rections beyond Westerly, are the affiliated lines of the Norwich & Westerly Traction Company. Just north of Norwich the Shore Line Electric Railway branches north-west to Willimantic and extends beyond to South Coventry.

The cars of the entire system carry a large number of tourists through the summer season, and have a heavy increase of traffic due to the immense number of cottages along the shore of the Sound and along the Thames River between New London and Norwich. All this section is famous for its watering places and for the beauty of its coast, and of the river and lake country of the interior.

It is on the section of the lines between New London and Willimantic, a distance of $31\frac{3}{4}$ miles, that the new cars are being operated. New London has a population of 20,000, Norwich, 28,000, and Willimantic, 13,000; the ap-



SHORE LINE ELECTRIC CARS. Ten of these cars were recently built by the Wason Manufacturing Company, and mounted on Brill 27-MCB1 Trucks

[illegible]

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ings without resorting to gusset plates, except at the corners. Deep Z-bars compose the end sills, and the car floor is ramped at each end of the body from the bolster to the platform. There are six double crossings made of pressed steel, and eight of light angles. The

taching the roof boards. The letter panels are of 3/32-in. steel, and the vestibules are sheathed below the windows with No. 16 sheet steel.

A double flooring of tongue-and-grooved yellow pine and maple and waterproofed between the



SHORE LINE ELECTRIC CARS. Brill tandem-sash semi-convertible windows, with their large openings, provide a bright interior in winter and a practically open car in summer

bolsters are made of 10-in. top and bottom plates with U-shaped pressed steel side plates; both crossings and bolsters are riveted to the underside of the sills.

In the body framing the corner posts are of pressed steel and the side posts of tee-section ending at the top plate. Steel carlines at each post have wooden carlines each side and one between for at-

taching the roof boards. The letter panels are of 3/32-in. steel, and the vestibules are sheathed below the windows with No. 16 sheet steel. A double flooring of tongue-and-grooved yellow pine and maple and waterproofed between the layers, has a ramp of 3 in. from the center of the bolster to the end sill at each end of the car. The aisle is provided with maple mat strips the full length of the car. A 5/8-in. air space is allowed between wood finish and the outside sheathing between the sash rests. Mahogany is employed for the interior finish and doors, and the ceilings are of Agasote painted

ivory white. Eight Brill "Exhaust" Ventilators are installed in the roof. Brill tandem-sash semi-convertible windows have brass sash stiles and mahogany top and bottom rails; the joint between the upper and lower sashes is also of brass. The tandem sash arrangement is only applicable to cars with the plain arch roof, as this form of roof permits the necessary depth of pocket. Every alternate window has the upper sash arranged to open inwardly at the top to provide additional ventilation. The cross seats are of the Brill "Winner" type and have pressed steel aisle and wall plates and pedestals, and double stationary foot rests. At each corner of the car is a longitudinal seat occu-

pying the space of three windows. All cushions and backs are covered with canvas-lined rattan.

In the vestibules, all three windows are of the single-sash type and arranged to drop; the center sash has post racks to hold it at various heights. Brill Automatic Folding Doors enclose the sides of the vestibules and are hinged to the vestibule corner posts. Stationary steps are provided at each side of the platform. A sheet steel bumper shield is fitted over the channel bumper at each end.

All of the cars are mounted on Brill 27-MCB1 trucks, each having a wheel base of 6 ft., and are spaced at 24-ft. centers. They are arranged to permit free radiation on a 40-ft. curve.

NEW CARS FOR THE SCRANTON & BINGHAMTON RAILROAD COMPANY

BRILL SEMI-CONVERTIBLE TYPE

FOUR cars of the type illustrated, lately placed on the lines of the Scranton & Binghamton Railroad Company, were built by The J. G. Brill Company and are similar to former equipment furnished by the same builder, but are longer and have a number of new items. The new cars are being operated between Scranton and Nicholson, a distance of 22 miles, and serve the towns, north of Scranton, of Chinchilla, Clark's Summit, Glenburn, Dalton, Brookside, La Plume, Factoryville Caryls and Nicholson. In

a few weeks 19 miles of additional line, serving Foster, Brooklyn and Montrose, will be open for operation, and the cars will run through to Montrose.

Between Scranton and Nicholson the running time is 1 hour 20 minutes, and to Montrose from Scranton, a distance of 41 miles, the running time will approximate 2 hours. The present grades are frequent and severe, the maximum being 9 per cent. and the longest about 1,500 feet. Surveys have been made for the betterment of both grades and alignment on the



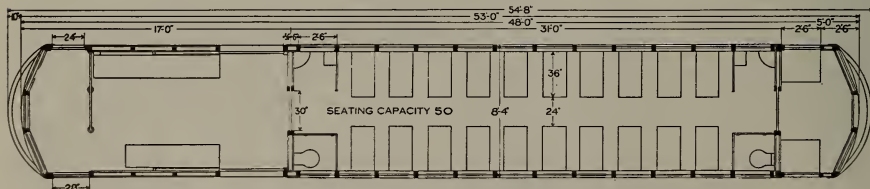
PASSENGER AND SMOKING CARS FOR SCRANTON & BINGHAMTON RAILROAD. The four cars of this new lot are longer than former Brill cars of similar design. All are mounted on Brill 27-E1 Trucks

section of the road between Scranton and Clark's Summit, which will reduce the gradient to 2 per cent. or less.

The extension to Binghamton, with a branch from Halsted to Susquehanna, is in the course of construction, and it is planned to build a branch from Montrose westward to Wyalusing. At present the company controls approximately 75 miles of street and interurban railway and, without including the proposed line to Wyalusing, will, upon completion of the system to Binghamton, have about 150 miles of lines. The territory served represents two large terminals with an intermediate territory comprising some of the

best agricultural, orchard and dairying country in the States of New York and Pennsylvania. The character of the population served is exceptionally diversified and remunerative, consisting of a mining and industrial community at one terminal; an unusually large and rich intermediate agricultural and dairying population and a large and fast growing manufacturing community at the secondary terminal. The population of Scranton is 150,000 and of Binghamton, 60,000; the intermediate territory tributary to the lines has a population of 50,000.

At present six to eight cars are used in normal operation between Scranton and Nicholson, which



PASSENGER AND SMOKING CARS FOR SCRANTON & BINGHAMTON RAILROAD. Height from track to underside of side sills, 2 ft. 11 1/4 in.; underside of side sills over trolley boards, 8 ft. 9 in.; floor to center of headlining, 7 ft. 10 in.; track to step, 18 in.; step to platform, 15 1/2 in.; platform to floor, 8 3/4 in.

will be considerably supplemented when the Montrose extension is in operation, and 26 cars will be available for all classes of service. The cars are operated both singly and in train service, and all have motor equipment.

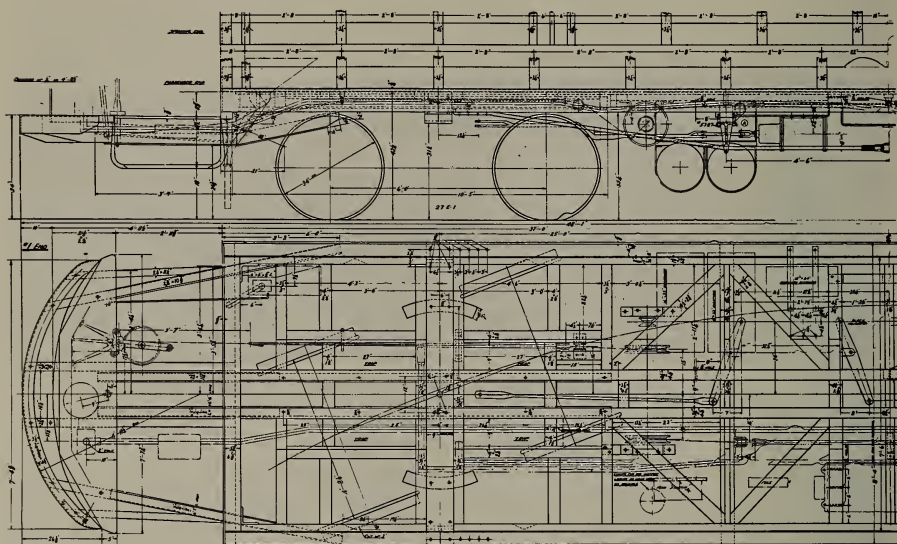
As there are many summer resorts along the line, and because of Northern Electric Park and Lake Winola Park, which are both owned by the company, the traffic is much heavier during the summer season. Lake Winola Park is the terminus of a 5-mile branch extending west from the main line below Factoryville and is very popular throughout the region,

both as an amusement park and as a summer resort. The park service differs from the ordinary amusement park business because of the fact that the distance from Scranton, and consequently the rates of fare, are much greater than usual. The excursion round-trip fare to Northern Electric Park is 25 cents and to Lake Winola Park, 75 cents.

The cars are built on an underframe consisting of double side sills of long leaf yellow pine, with 15 by $\frac{3}{8}$ -in. steel plate between; end sills of $5\frac{1}{4}$ by $6\frac{7}{8}$ -in. oak; needle beams of $4\frac{1}{2}$ by $5\frac{1}{2}$ -in. oak; and diagonal braces of $2\frac{3}{4}$ by $4\frac{1}{2}$ -in. oak. Undertruss rods



PASSENGER AND SMOKING CARS FOR SCRANTON & BINGHAMTON RAILROAD. Main compartment, looking towards the smoking compartment. Brill semi-convertible window system



PASSENGER AND SMOKING CARS FOR SCRANTON & BINGHAMTON RAILROAD. Double sills of yellow pine have a 15 by $\frac{7}{8}$ -in. steel plate sandwiched between

of $1\frac{1}{8}$ -in. diameter reinforce the side construction. Bolsters of the built-up open type have a 9 by $\frac{5}{8}$ -in. top plate and 9 by $\frac{7}{8}$ -in. bottom plate. In the upper framing the corner posts are of ash, $3\frac{5}{8}$ in. thick, and the side posts, $3\frac{1}{4}$ in. thick. The side sheathing is of vertical poplar boards, tongue and grooved. A monitor type of roof is employed and extends over the hoods as in steam-car practice. The roof is strengthened with concealed steel rafters placed to relieve the strain of the trolley apparatus to the best advantage, and these rafters are securely bolted to the top rails. Thirteen ventilator sashes on each side of the car are glazed with wire glass and are hinged and fitted with double openers.

Cherry stained mahogany color is used for the interior finish and also for the doors, linings and

mouldings. Ceilings of $\frac{1}{4}$ -in. Agasote are painted Nile green and striped with gold. In the main compartment a toilet room is located next the partition and is provided with the standard appointments. Nine transverse seats on one side of this compartment and eight on the other are of the Brill "Winner" type with pressed steel aisle and wall plates and pressed steel pedestals. Next the bulkhead are longitudinal seats accommodating two passengers each. The seats in this compartment are upholstered in plush and those in the smoking compartment are covered with imitation leather.

The cars are equipped with automatic brake equipment, with straight air attachments and automatic car and air couplers. They are mounted on Brill 27-E1 trucks, equipped with four 50 hp. capacity motors per car.

ONE-MAN PREPAYMENT CARS FOR THE TIDEWATER POWER COMPANY

ALL-STEEL FRAMING CONSTRUCTION

THE Tidewater Power Company, of Wilmington, North Carolina, has lately placed in operation three one-man prepayment cars built by The J. G. Brill Company. The cars are being used on a $2\frac{1}{4}$ -mile section of the system

30,000, and is connected with other parts of the State by main lines of the Atlantic Coast and Seaboard air line systems. Directly east, and eight miles distant on the ocean front, is Wrightsville Beach, on an island separated by a nar-



PREPAYMENT CARS FOR TIDEWATER POWER COMPANY. The doors on both sides of the platform fold against the vestibule corner post. The arrangement adapts the cars for operation by one man or by two

between Union Depot and a populous resident district. The prepayment system has been in use on the lines for the past seven months, and in the new cars one man serves as motorman and conductor, excepting on special occasions when the traffic is unusually heavy.

Wilmington is the principal city of the southeastern part of North Carolina, and is on Cape Fear River. It has a population of

row sound from the mainland and the town of Wrightsville. Wilmington and Wrightsville Beach are among the most popular resorts of the lower Atlantic coast both in winter and summer, as in winter the proximity of the Gulf Stream gives the locality a delightfully mild climate, and in summer a steady breeze from the ocean keeps the atmosphere clear and pleasant.

The lines of the Tidewater

Power Company spread over the city in a number of directions, and a line extends through suburban colonies eastward to the beach, furnishing the only railway connection between the terminals. The major part of the system is double-tracked, and a fast and frequent service to the beach has developed a large and steadily growing traffic throughout all seasons of the year. Near the southern end of the beach the lines reach Lumina Pavilion, owned by the company and said to be one of the largest of its kind on the coast; and, together with the large hotels, yacht clubs and numerous cottages, it is an interesting

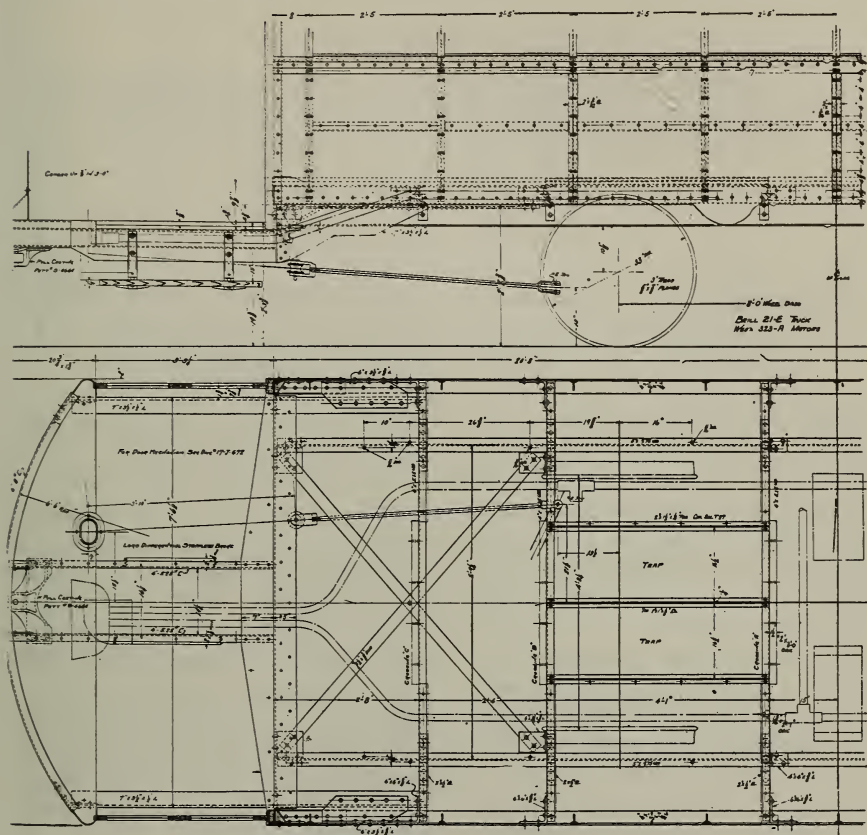
place for visitors and is gaining a widespread popularity year after year.

An interurban type of excursion car, seating 52 passengers and mounted on high-speed trucks, is operated in trains made up of several units, between the center of the city and the beach, and makes the run in 35 minutes. No grades on the system exceed 2 per cent., and the curves are few and of long radii.

In the underframe of the new cars, the side girders carry the load of the body and platforms and transmit it through angle side sills and pressed steel crossings to I-beam sub-sills resting on the



PREPAYMENT CARS FOR TIDEWATER POWER COMPANY. The upper sashes are framed in a continuous piece. Lower sashes raise full height. Brill "Winner" seats

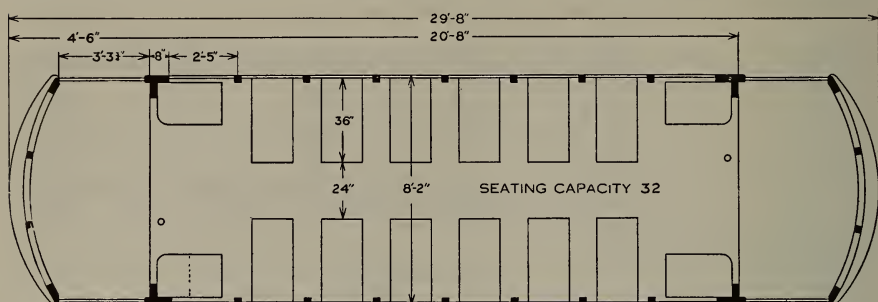


PREPAYMENT CARS FOR TIDEWATER POWER COMPANY. All-steel bottomframe with plate-girder sides and T-post upper structure

upper chords of the truck and abutting at pressed steel Z-shaped end sills. The platform at each end is supported on channel knees which are capped with a Brill angle-iron bumper six inches from the vestibule sheathing, and surmounted by a bumper shield.

The side and corner posts are steel tees extending from the bottom of the side sill to the top rail. Angles are used for the top rails, and the letter panel is made of sheet steel; other sheathing, such as at the corner posts and the front

of the vestibules, is also of sheet steel. The upper sashes are framed in a continuous piece and held in place at the top by a lip pressed in the steel letter panel, and at the bottom by metal clips on the posts. The flooring is composed of 13/16-in. narrow yellow pine boards secured to the nailing strips of the bottom framing and provided with maple floor mat strips extending the full length of the aisle. Cherry constitutes the interior lining of the car and also the doors, sashes and mouldings; the ceiling is of



PREPAYMENT CARS FOR TIDEWATER POWER COMPANY. Height from track to underside of side sills, 2 ft. 7 3/4 in.; underside of side sills over trolley boards, 8 ft. 9 1/4 in.; floor to center of headlining, 7 ft. 10 1/2 in.; track to step, 14 1/2 in.; step to platform, 13 in.; platform to floor, 9 1/2 in.; total weight, 22,400 lb.

Agasote and continued under each platform hood. The lower side sashes have metal stiles and are arranged to be held half open or at full height. The three vestibule windows have double sashes, the upper sashes sliding down outside the lower.

In front of the motorman's position and directly over the vertical brake wheel is located a handle for operating the double folding door at the motorman's right; a shaft and handle on the end sill operates the opposite door, and the

steps at both sides operate in conjunction with the doors.

Six transverse seats with reversible backs are of the Brill "Winner" type with cherry slat cushions and backs and bronze grab handles. Six Brill "Exhaust" Ventilators, three on each side of the roof, draw off the vitiated air from the upper part of the carbody. Trucks of the Brill 21-E type carry the cars and have the standard equipment of Brill "Half-Ball" brake hangers and "wide-wing" journal boxes.

STEEL INTERURBAN TYPE FOR CLEVELAND & EASTERN

(Continued from page 179)

smoking compartment a folding seat occupies the space at the door of the motorman's platform. Continuous parcel racks are provided in both compartments, and a package and mail cage at the rear of the motorman's platform.

Twelve Brill "Exhaust" Ventilators, six on each side of the roof, have regulating registers attached to the headlining. The equipment includes hot-water heating system, air brakes, automatic air couplers,

fender, sand boxes, trolley retriever, anti-climber bumpers, registers, signal lamps, air whistle, etc., and the car is mounted on Brill 27-MCB-2X trucks, which have a wheel base of 6 ft. 9 in., 34-in. wheels, and are capable of a speed of 50 miles per hour; they are equipped with 65-hp. motors, four per car. The bolster centers are 31 ft. 9 1/8 in., and the trucks are arranged to radiate on a curve of 37 ft. 6 in.

SUGGESTIVE SUBJECTS

NOTE.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

COURTESY ALWAYS

YOU conductors and motormen were hired to be cheerful and courteous—it is as much a part of your business as running the car or collecting fares.

You wouldn't think of getting on the platform with a controller handle or ticket punch that was unfit for service. Then don't take a frame of mind aboard that is unfit for service.

There is probably a certain shop you won't deal with because of some unpleasant experience with an employe. The shop is all right, but you don't think so because of that discourteous employe.

Of course, people won't stop riding on your car because they don't like you, but they are likely to judge the whole service by your conduct.

It is up to the company to give the public the best possible service, not only in cars and equipment, but in men. That is why the company is extremely particular in selecting men who are cheerful and courteous as well as careful and competent. And not most of the time to most of our patrons, but all of the time to all of our patrons.

GOING UP

EVERY now and then we find a motorman or conductor who takes a genuine interest in his work. He shows it in the neat appearance of his uniform. He looks as if he gave himself enough sleep and had a bath and shave before he came on duty. His voice has a ring to it that shows self-confidence and his bearing gives evidence of pluck and stamina. When the manager happens to board his car he is not perturbed, but goes ahead with his duties with nothing to change in his conduct under the eyes of his chief. Such a man is getting more out of his job than what is in his pay envelope—he is gaining character and experience and a place among those who are considered the best of his class on the road. He is aiming straight for the opening that will come some day which will lead him higher up.

VACATION TIME

IF you can possibly help it, don't take a day off at a time in lieu of a vacation.

Go away off where you won't think or talk business and where you won't see a newspaper or know anything that is going on in the world of affairs. Get the full benefit of a complete reaction from your regular life. Rest and recreate your brain.

Go where you can refresh your lungs and stimulate your circulation with a different air than that which you are accustomed to breathe.

Go where you will get plain fare with less meat than usually goes with your meals, and rest your stomach.

Then walk, ride horseback, row, swim. What if you do get blistered hands, sore muscles or sunburn—you will have had a real vacation, a real recreation time!

BRILL ORDER GUIDE FOR CAR PARTS

THE Brill Order Guide for Car Parts and Specialties No. 201 will assist the Storekeeping Department when ordering parts or supplies for rolling stock built at any of our plants. A strict adherence to page 9, "Directions for Ordering," will give us the exact parts desired and thereby do away with any chance of a misunderstanding. If your Storekeeper hasn't this catalog on file we will be pleased to send him a copy upon request to Publicity Department, The J. G. Brill Company.

BRILL PUBLICATIONS

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THOSE who receive BRILL MAGAZINE are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.



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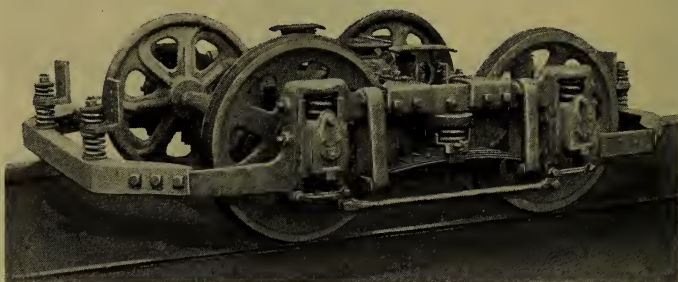
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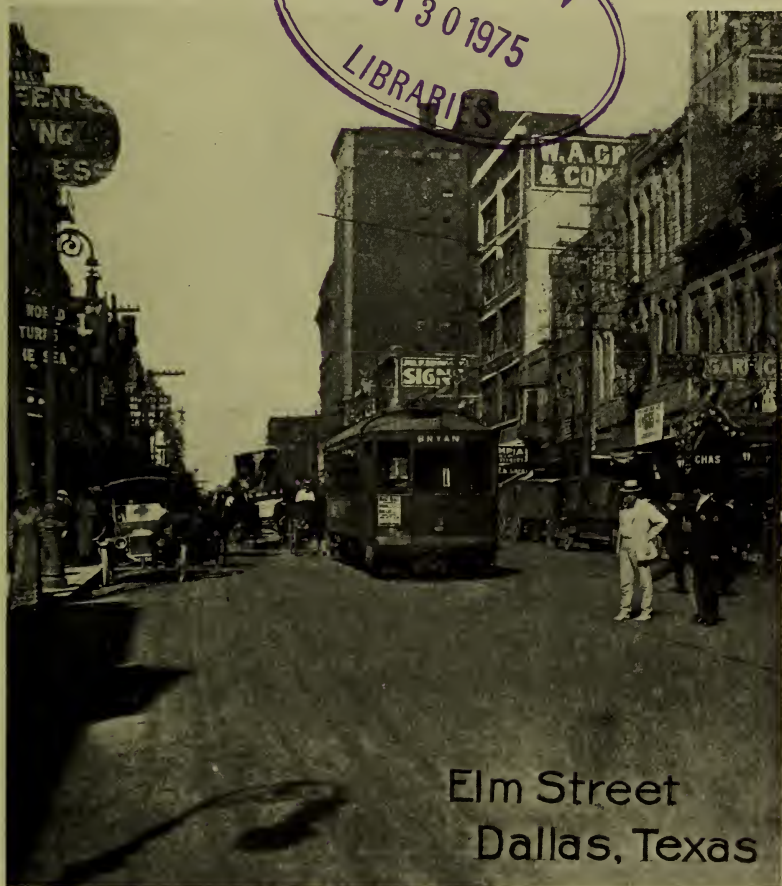
THE BRILL 76-E TRUCK

SOLID forged side frames, angle end frames, deep angle transoms secured to the side frames with single- and double-corner brackets and fold-over gusset plates, one-piece cast-steel bolster, oil-retaining center plates, "Half-Ball" brake hangers, and graduated spring system for light and heavy loads—these are the principal features of the 76-E Truck and are a combination that give superior strength and riding qualities. The Brill Graduated Spring System is the latest feature and is standard in all Brill short-base pivotal single- and double-motor trucks. It automatically puts bolster coil springs in motion when the car has less than a full load of seated passengers, and as cars run with a light load most of the time, the easy spring action is immensely important.

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BRILL MAGAZINE

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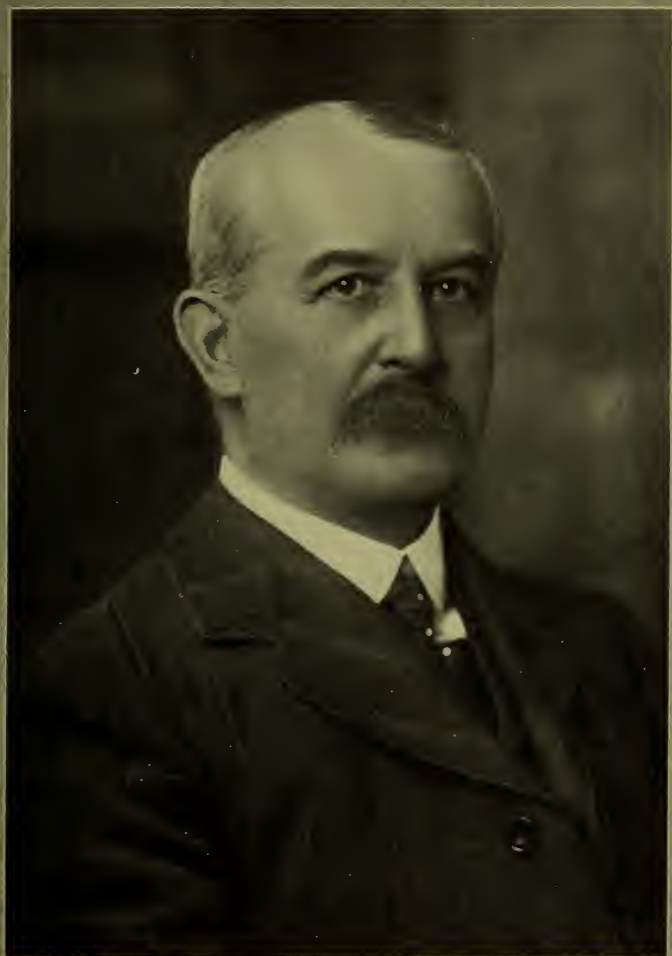


Elm Street
Dallas, Texas



BRILL "DEDENDA" GONG

NOTICE that the pedal in the picture is pushed down as far as it will go; at this point the momentum given by the pedal, and assisted by the weighted portion of the clapper, carries the clapper against the gong, and there is an immediate rebound. This gives a sharp, clear tone, with no possibility of a chattering sound being produced, either by accident or design. When not in use, the pedal is locked down by a half turn. A perspective view of the pedal and socket at the right of the illustration shows the pedal locked. The gong is made in 8, 12 and 14-in. sizes. When ordering, give size of gong desired and thickness of platform crown-piece.



H. Linsley

PRESIDENT, MUNICIPAL TRAMWAYS ASSOCIATION OF GREAT BRITAIN
CHAIRMAN, SALFORD TRAMWAYS COMMITTEE

In every field of human activity you will find a few men, sometimes but one or two, who are recognized as the leaders in their particular field and who, quite frequently, occupy commanding places in fields other than that which they dominate.

These are what we call "big" men—captains of industry—builders of empire—shapers of the country's destiny.

"Bigness" in a man may be roughly described as the ability to foresee the possibilities of the future, the intelligence to formulate plans for turning such foresight to advantage and the capacity and resourcefulness to push them through to a successful conclusion.

Men of this type constitute the general staff of the army of progress. They plan and create new industries—make world-wide markets and dominate them—furnish means of travel and transportation, and populate new territories. Nothing is impossible to them. They are "big" men.

Bigness often appears in unexpected places. Wherever it may exist, it is sure to manifest itself and leave its impress.

Some men are born with the elements of bigness; some attain to bigness; but no man ever has it thrust upon him.

The big man becomes so through his own efforts and those of the co-workers whom he has the intelligence to appoint.

JULY 15, 1915

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HENRY LINSLEY

HENRY LINSLEY, President of the Municipal Tramways Association, of Great Britain, and chairman of the Salford (England) Tramways Committee, was born at Yorkshire, England, in the year 1844. His business career began at an early age in the city of Manchester. Later he transferred his activities to the adjoining borough of Salford, where his aptitude for municipal affairs soon became manifest. In 1866 he was elected to the Borough Council and after a service of twelve years in this capacity was appointed an Alderman. In 1901 he was elected the first chairman of the Tramways Committee, which office he still retains, and ten years later, in 1911, he was elected Mayor of Salford. He was one of the earliest members of the Municipal Tramways Association, and is the first lay member to become President of this important body, having been elected to that office in 1913. His long experience in public service has given him a wide knowledge of municipal administration and parliamentary procedure, and he is held in high esteem by his associates in the British tramway world.

INTERURBAN CENTERS AND INTERURBAN CARS

DALLAS. TEXAS

TEXAS, the largest state in the Union, has the major part of its population in the eastern section, owing to the fertility of the soil and its climatic conditions. The chief industry of the state is agriculture, with cotton as its principal product. About one-third of the cotton produced in the United States comes from Texas, and the average yield per acre of all products is steadily increasing by improved methods of cultivation. The diversity of the soil, climate and rainfall permit of a large variety of farm products. The land in this section is of a gently rolling nature and, in addition to agriculture, is well adapted to stock raising.

Dallas has a population of about 125,000 and is at the population center of the state. A circle of a hundred miles radius drawn around the city includes one-third of the population of Texas, although containing but 10 per cent. of the total area of 274,000 square miles. Besides being the largest inland cotton market in the world, Dallas leads in the manufacture of saddlery and cotton-gin machinery. It is the jobbing center of the southwest and has a steady as well as rapid development in all lines of manufacture. The city is served by nine trunk-line steam roads, which connect it with all points in the state and with the principal cities throughout the United States, and two highspeed interurban sys-

tems connect the city with cities and towns to the north, south and west. A third interurban system is now under construction, and will serve the territory to the east and assist in the development of a fertile and prosperous farming country.

The street railway and lighting properties of Dallas are under the general management of the Stone & Webster Management Association, and have a trackage of nearly 70 miles. The city railways of Fort Worth are under the same management. The interurban systems between Dallas and Fort Worth, known as the Northern Texas Traction, and the interurban system between Fort Worth and Cleburne, known as the Tarrant County Traction are also under the Stone & Webster management.

While the Northern Texas Electric Company, with its affiliated companies, the Northern Texas Traction Company and the Tarrant County Traction Company, center at Fort Worth, these systems may be considered as contributing to Dallas as the chief interurban center of the state. Fort Worth has a population of 87,000 and Cleburne, 15,000. The tributary population of the Dallas-Fort Worth system is estimated at 220,000, and that of the Fort Worth-Cleburne system at 105,000, or a total tributary population for the combined systems of 237,000.

From a central point in Dallas the Northern Texas Traction cars operate directly west for a distance of about 35 miles through Grand Prairie, Arlington and Handley to Fort Worth. Out of Dallas the line is double-tracked for 5 3/10 miles; between Handley and Fort Worth, 7 6/10 miles; and these, together with sections at Arlington and Grand Prairie, make a total of 16 miles of double track.

Standard overhead trolley system is employed on the single-track lines, with catenary construction over the double-track sections. Except in towns and at road crossings, the line is entirely on private right-of-way, permitting high-speed operation. Seventy-pound rails are used on standard steam railway roadbed, and for 6 miles out of Dallas the line is protected by block signals.

Power is generated at a modern power plant at Handley, from which it is delivered on duplicate transmission lines at 15,000 volt, 3-phase, 25-cycle alternating cur-

rent to the five sub-stations of this system and to two sub-stations on the system between Fort Worth and Cleburne. A sub-station car with a capacity of 400 kw. is also employed, and is moved from place to place as occasion demands. The trolley voltage of the lines is 600.

Between Dallas and Fort Worth





INTERURBAN CENTERS AND CARS. Looking down Main Street, Fort Worth, from the Court House, the terminus of the interurban lines. A "Limited" is just arriving from Dallas

the running time is one hour for limited cars or trains making no stops, and these are despatched hourly in both directions from 7.30

a. m. to 6.30 p. m. Local cars, making all stops, leave the terminals hourly from 6 a. m. up to 1.30 a. m. Short stop cars are operated



Interurban station and office building of the Northern Texas Traction Company at Fort Worth

between Fort Worth and Handley in both directions, and east-bound only between Handley and Dallas. Direct connections are made at Dallas with the interurban cars of the Southern Traction Company to Waco and Corsicana, and with the cars of the Texas Traction Company to Denison. Cars are operated with trailers during the rush hours and are run singly be-



VIEWS ON THE NORTHERN TEXAS TRACTION COMPANY

Typical station along the line. Undergrade crossing with Texas & Pacific Railway at Handley. Plate girder bridge over Sycamore Creek, just outside of Fort Worth



INTERURBAN CENTERS AND CARS. Power station at Handley, seven miles east of Fort Worth. Furnishes current for five sub-stations of the Dallas-Fort Worth line and two of the Fort Worth-Cleburne line. Capacity, 10,800 kw.

tween times. Baggage and express cars are operated five times each way daily.

The Tarrant County Traction line between Fort Worth and Cleburne is 30.2 miles long and is of single-track throughout, with the

overhead construction of catenary type for the entire distance. This system is also on private right-of-way. The running time of all cars is 1 hour and 18 minutes southbound and 1 hour and 20 minutes northbound, and cars run from Fort Worth from 6.30 a. m. each hour thereafter until 11 p. m. From Cleburne the first car leaves at 7 o'clock, and hourly until 10 p. m. Two express cars are operated each way daily.

Between Dallas and Fort Worth the number of passenger cars used in normal operation is 8, and



"Rock Cut Siding" on the Northern Texas Traction, showing telephone booth and block signal installation



INTERURBAN CENTERS AND CARS. Express station, Fort Worth, with standard type of express and baggage car. The express business is handled by the North Texas Transfer & Warehouse Company

between Fort Worth and Cleburne, 3. The total number of passenger cars available for both systems is 26 motors and 9 trailers. During the year 1914 the number of passengers carried on both lines was 2,451,293, and the car mileage, 1,729,946. For the same year the number of pieces of express matter carried was 39,911.

The standard car of the system, shown in the illustration on page 201, is arranged for single-end operation, and has a seating capacity in the main compartment of 30 and in the smoking compartment of

24. The length over the body is 40 ft., over the vestibules 51 ft. and over the bumpers 52 ft.; width over sheathing, 8 ft. 10 in.; height from track to sill, 3 ft. 7 in.; from the underside of sill over center of roof, 9 ft. 3 11/16 in.;



On the line of the Northern Texas Traction west of Boundary

bolster centers, 35 in.; truck wheel-base, 6 ft. 6 in.; diameter of wheels, 37 in. The side sills are of yellow pine reinforced with 6-in. channels, with inside fillers of yellow pine. The center sills are I-beams with pine fillers, and the intermediate sills are reinforced from the buffers to 3 ft. beyond the bolsters with steel plates. The interiors of the cars are handsomely finished in mahogany and have agasote ceilings. Non-reversible seats have high three-part backs. The front platform has a door at the right side only, and the rear platform has doors at both sides, and is provided with a train door at the center. The motor equipment consists of four 75-hp. capacity motors, and the 13 cars purchased since 1910 are arranged for ultimate multiple-unit operation.

Running north and south of Dallas are the affiliated lines of the Texas Traction Company and the

Southern Traction Company. The most populous points on the northern line are McKinney, Sherman and Denison; the last named is the northern terminus and has a population of about 15,000. It is estimated that the cities and towns on the line furnish a combined tributary population of 42,540, and that the rural population adds 21,270.

The route parallels the Houston & Texas Central Railroad for practically the entire distance, and one-half of the way adjoins this road. The line is all on private right-of-way, and consists of 87.92 miles of single-track and 1.09 miles of double-track laid with 80-lb. rail and ballasted with rock or gravel. Of the 12 steel bridges on the line, the largest is a combined crossing of the Frisco Railroad and Choctaw Creek between Sherman and Howe. This structure consists of a 45-ft. through plate girder over the



INTERURBAN CENTERS AND CARS. Motor and trail cars of the Northern Texas Traction System



INTERURBAN CENTERS AND CARS. Standard passenger car of the Northern Texas Traction Company used in limited service between Dallas and Fort Worth

railroad and a 100 ft. deck truss over the creek and connected by a steel viaduct 735 ft. long. The grades are generally within $1\frac{1}{2}$ per cent. and a maximum grade of 4 per cent. for 600 feet in the streets of McKinney.

The transmission and trolley wires are carried on a single line of poles through the interurban districts, but span construction is generally used in the cities and towns. The power station at McKinney is very nearly the center of the line and supplies four sub-stations at an average distance apart of 13 $\frac{9}{10}$ miles. The current is transmitted at 3-phase, 19,100

volt, 25-cycle, and is put on the trolley lines at 600 volts.

Starting at the terminal in the heart of Dallas, the cars, which are operated both singly and with trailers make the run to Denison in 3 hours if they are limiteds, and about $3\frac{1}{2}$ hours if they are locals.



Interior of the above car. Seating capacity of main compartment, 30; smoking compartment, 24

The service consists of 14 through cars on trains each way daily, and 6 trains northbound and 7 southbound over parts of the line. The limiteds make stops only in cities and towns given on the time-table, and the locals may make all stops. The maximum speed is 50 miles per hour, and two stops are averaged

and Corsicana, and with the Northern Texas Traction for Fort Worth and Cleburne.

For the year 1914 the number of fare passengers carried was 2,972,032, and the car mileage, 1,993,920. For the same year a total of 39,306,447 lb. of express matter was carried. It is planned to en-



INTERURBAN CENTERS AND CARS. Interurban terminal station of the Texas Traction Company and Southern Traction Company, at Dallas

per mile. The number of passenger cars available is 39.

The express business is divided into two classes: "Class A" collects and delivers, and "Class B" only covers transportation by rail. There are four through express cars daily southbound and five northbound.

Direct interurban passenger connections are made at Dallas with the Southern Traction, for Waco

large the Texas Traction System within the near future, and the surveys have been made for a line about 60 miles in length.

The standard motor car of the system, shown on page 205, is a single-end type built on an underframe consisting of four 6-in. I-beam center sills extending from bumper to bumper and having yellow pine fillers, and side sills of yellow pine with 18 by $\frac{3}{8}$ -in. plate

on the inside and a Z-bar riveted to the bottom. The cars are finished in golden quartered oak, and are furnished with reversible-back seats of three-part type upholstered in leather. The main compartment seats 36 and the smoking compartment 26. At the right of the front end is a motorman's compartment

Brill 27-MCB3X trucks, which have a wheel base of 6 ft. 6 in., and are capable of a speed of 60 miles per hour. There are four motors per car of 100-hp. capacity each. The cars are equipped with multiple-unit control.

The territory to the south of Dallas is served by the two lines of



INTERURBAN CENTERS AND CARS. Long fill and steel trestle on the Texas Traction System

with single window in the end and a side window and door; the door serves as an entrance and exit for the smoking compartment. The toilet room is located on the rear platform opposite the entrance, and this platform is provided with a train door. Length of car over the vestibules, 55 ft. 5 $\frac{3}{4}$ in., and over the bumpers, 56 ft. 10 $\frac{3}{8}$ in.; width over steel side sheathing, 8 ft. 10 in. The cars are mounted on

the Southern Traction Company, one of which extends in a southeasterly direction to Corsicana, a distance of 55 $\frac{3}{4}$ miles and the other runs almost directly south to Waco, 97 miles. On the division of which Corsicana, with a population of 12,000, is the terminus, the principal points are Ferris, with 1,500 population, and Ennis, with 6,000 population. It is estimated that the towns of this division fur-



INTERURBAN CENTERS AND CARS. Power station of the Texas Traction Company, centrally located at McKinney, and supplying the four sub-stations of the system

nish a tributary population of 22,350 and that the rural population is about 11,200 additional.

The service on the Corsicana Division consists of 12 through cars or trains each way daily, leaving Dallas on the hour. Three of the cars are limiteds and make the distance in two hours, while the local

car schedule calls for 2 hours 15 minutes running time. The cars are operated with trailers during rush hour periods and singly at other times. Three express cars are operated each way daily and handle matter of classes "A" and "B," the same as the Texas Traction System.



Sub-station, waiting room and express office of the Texas Traction System at Van Alstyne

Waco, at the southern end of the longer division of the Southern Traction Company, has a population of about 30,000, and the principal points on this line, with their population, are as follows: Lancaster, 13,000; Waxahachie, 7,000; Italy, 13,000; Hillsboro, 7,000; West, 2,000. The combined population of these and other towns on



INTERURBAN CENTERS AND CARS. Standard passenger motor car of the Texas Traction System, arranged for single-end operation and multiple-unit control

the route is estimated at 53,600 and the rural population at 26,800.

The time-table of the Dallas-Waco Division gives 15 through cars or trains each way daily, of which 6 southbound and 7 northbound are limiteds. There are two additional cars each way between Dallas and Waxahachie and two cars between Hillsboro and Waco. During heavy traffic periods motor cars are operated with trailers, and at other times singly. Three baggage cars are operated between terminals each way daily.

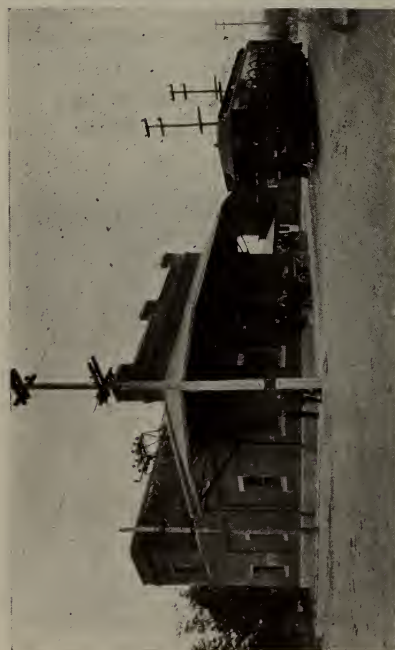
Both divisions of the Southern Traction System have the same type of overhead and road construction as the Texas Traction System. The

two divisions have a combined trackage of 175.89 miles of single-track and 2.04 miles of double-track.

The latest standard motor car of the Southern Traction Company, shown in the illustration on page 208, consists of a single-end two-compartment type, with a limited



Interior of above car. Seating capacity of main compartment, 36, and of smoking compartment, 26



VIEWS ON THE SOUTHERN TEXAS TRACTION SYSTEM

Combination sub-station, passenger station and baggage room at Lancaster
Standard passenger and express station

Junction station of Southern Traction and Northern Texas Traction Systems
Attractive waiting station at country stop



INTERURBAN CENTERS AND CARS. A typical scene on the Southern Traction lines

baggage space at the forward end. The construction is of the reinforced steel side girder design, with an all-steel underframe. This

car seats 54 passengers. The trail car, which is shown coupled to the motor car in the illustration, is one of an order described in the Feb-



INTERURBAN CENTERS AND CARS. Dallas express station of the Texas Traction and Southern Texas Traction Systems

ruary, 1914, issue of BRILL MAGAZINE, and measures 41 ft. 2 in. over the body, 53 ft. 2 in. over the vestibules and 54 ft. 2 in. over the bumpers; width over steel side sheathing, 8 ft. 10 in.; seating capacity, 54. These cars have the entrance at both sides of the platform and train doors at each end. They

tion System is 85. The maximum speed is 50 miles per hour, and as the lines are on private right-of-way a high speed is maintained. The number of stops per mile averages 3.

The traffic statistics for last year show the number of passengers carried on the two divisions of this



INTERURBAN CENTERS AND CARS. Standard motor and trail cars of the Southern Texas Traction lines

are built on an underframe of composite construction, with yellow pine side sills reinforced by 6-in. channels having inside fillers of yellow pine; I-beam center sills and yellow pine intermediate sills plated with 6 x 3/8-in. steel plates. Both motor and trail cars are mounted on Brill 27-MCB3X trucks.

The total number of passenger cars available for operation on the two divisions of the Southern Trac-

tion System is 85. The maximum speed is 50 miles per hour, and as the lines are on private right-of-way a high speed is maintained. The number of stops per mile averages 3.

In the near future Dallas will have another interurban system in operation, which will eventually connect important points to the east of the city as far as Greenville, 53 miles distant. This system is under construction by the Eastern Texas Traction Company, and will be operated with overhead trolley.

FIFTY CARS FOR THE METROPOLITAN STREET RAILWAY, KANSAS CITY BRILL 77-E TRUCKS

FIFTY double-truck cars of the single-end prepayment type, built at the plant of the American Car Company, have been put in operation recently by the Metropolitan Street Railway Company, of Kansas City, Missouri.

This system is owned by the Kansas City Railway & Light Company, and connects Kansas City with Independence, Missouri, and Rosedale and Argentine, Kansas; has 264½ miles of track and operates 584 motor cars and 153 cars of other types.

The territory in and about Kansas City is of a hilly nature, and many grades are encountered in street railway operation, the severest of which is 10.875 per cent. The population in 1915 is estimated at 300,000, and that of Kansas City, Kansas, which lies across the Kansas River to the west, is estimated at 100,000.

The streets are generally wide and well paved, and there are a number of fine boulevards. An interstate viaduct, con-

necting the city with its sister across the river, presents an interesting piece of road construction. The tracks are laid through a tunnel beginning just outside of the business section and emerging, at a somewhat lower level, from the face of a cliff overlooking the Kansas River, where they continue on a descending grade across the viaduct and are finally depressed to the street level after traversing the



FIFTY CARS FOR KANSAS CITY. Double folding doors and single folding step at rear platform are operated conjointly by crank handle on conductor's railing



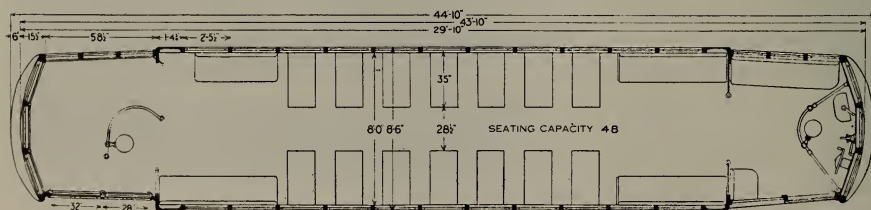
FIFTY CARS FOR KANSAS CITY. The cars are for single-end operation. All are mounted on Brill 77-E Trucks with 6-ft. wheelbase and 30-in. wheels

land adjacent to the river on elevated tracks.

The lines converge in the distinctly modern and metropolitan business district and extend south and west into the residential district, and west, across the river as described above, to Kansas City, Kansas, where the stock yards, packing houses, soap factories and many other large and thriving industrial enterprises are located.

The new cars have steel girder side plates composed of three sections, to which, on the outside, at the top, is riveted a reinforcing channel, and on the inside, at the bottom, a steel angle with flange extending inwardly, upon which rests light wooden sill for tenoning

the posts, and for supporting the floor. The channel crossings are secured to the sides by forged double corner brackets. Plate end sills have angles at top and bottom. Cast steel bolsters, formed to allow riveted connections for the outside platform knees and diagonals, are lipped under the side construction. Diagonals connect the car corners with the bolsters and the sides between the bolsters. In addition to special cast brackets, utilized to support the outside platform members, heavy gusset plates extend outside the end sills and assist in the support of these members; and these plates are also employed for attaching the diagonals which brace the draft rigging; the draft



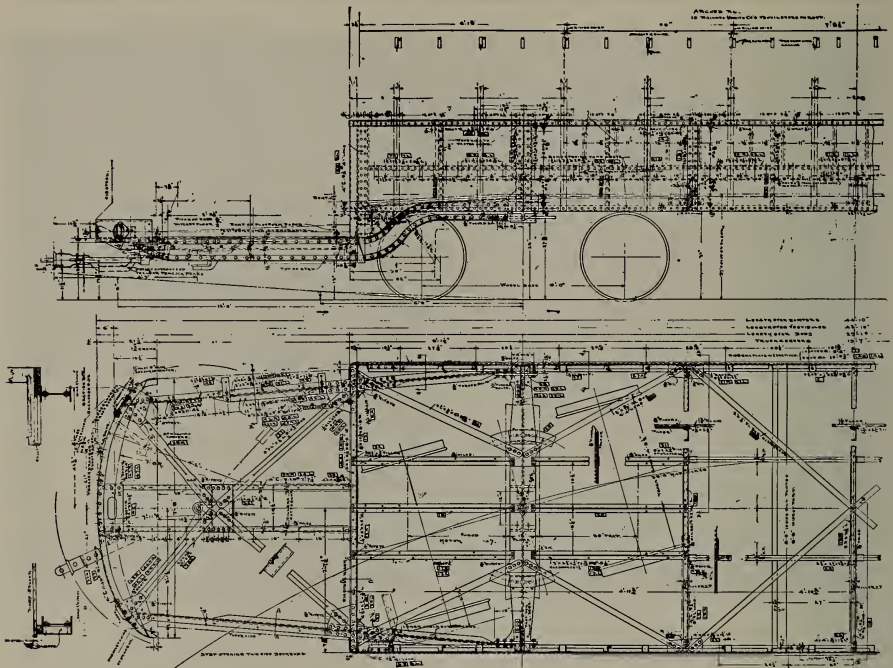
FIFTY CARS FOR KANSAS CITY. Height from track to underside of side sills, 2 ft. 7 in.; underside of side sills over trolley boards, 8 ft. 10 1/4 in.; floor to center of headlining, 7 ft. 8 1/2 in.; track to step, 13 in.; step to platform, 11 in.; platform to floor, 10 1/2 in.



FIFTY CARS FOR KANSAS CITY. Looking towards front end. Note the four hand-rail stanchions, and see floor plan on opposite page for front platform seating arrangement



FIFTY CARS FOR KANSAS CITY. Rear platform, showing conductor's seat (folded), door-operating handle and register pedal



FIFTY CARS FOR KANSAS CITY. Plate girder side construction; light steel underframe with powerful platform framing; ash side posts and channel corner posts

rigging plates are attached at center of platform to cross diagonals and longitudinal channels and give substantial resistance to maximum hauling and buffing strains.

The flooring, which is double, has a ramp of $2\frac{1}{2}$ inches from the bolster to end sill. The corner posts are double, with channel at the corner and ash inside, and covered with steel sheathing. The side posts are ash, tenoned into the side sill, and obtain additional reinforcement from the continuous framing of the upper sashes. The lower sashes have metal stiles and are arranged to raise full height. The Brill plain arch roof is supported on steel carlines riveted to a steel top plate over the side posts, and with intermediate car-

lines of ash midway between the steel carlines.

The diagram on page 210 shows the seating capacity to be 48, which includes four passengers on the front platform folding seats. In the car body the transverse seats accommodate 28; three of the longitudinal seats have room for four passengers each, and the one adjacent to entrance passageway seats three. The bulkheads are shoulder high, and the bulkhead header is supported by aluminum pipe stanchions.

The cars are mounted on Brill 77-E trucks, which are equipped with the Brill Graduated Spring System, which enables the cars to ride with uniform smoothness, whether the load is light or heavy.

ADDITIONAL ROLLING STOCK FOR THE DAN PATCH LINES

PASSENGER TRAIL CARS, GAS-ELECTRIC CARS AND FREIGHT CARS

THE Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company's lines, popularly known as the Dan Patch Electric Lines, and said to be the first gas-electric road in the world, extend south from the company's terminal building in Seventh Street, Minneapolis, a distance of 107 miles to Mankato, with a branch about midway of the line running northeast from Northfield to Randolph, seven miles distant. Another extension is contemplated from Faribault southeast to Owatonna, Waseca, Geneva, Albert Lea, Austin, Dodge Center, Rochester and beyond, having Dubuque, Iowa, as its objective terminal point.

The fine rolling section of Minnesota thus served by the "Dan Patch Lines," with its productive grain fields, dairy and truck farms and numerous thriving towns and cities of varied industrial activity, is one of the most prosperous in the "Bread and Butter State," and presents a splendid opportunity for the further development of the line.

The present business is large, and that the rate of increase is quite up to the Company's expectations is evidenced by the frequent addition of new rolling stock to its equipment.

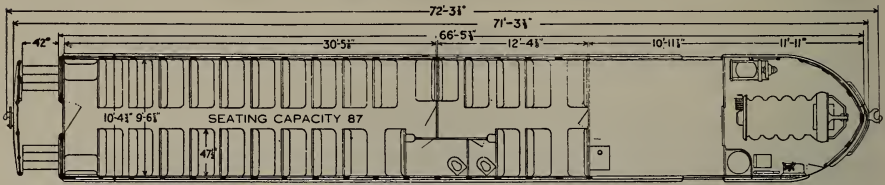
Twelve trail passenger cars and

forty-five freight cars, of the types illustrated, recently left the plant of The J. G. Brill Company on their own wheels for the "Dan Patch Lines," and two new gas-electric cars were dispatched about the same time from the plant of the Wason Manufacturing Company.

The territory presents few difficulties in road construction, the severest grade on the present line being 2 per cent. The line was built, and improvements are being constructed, with a view to permanency, re-inforced concrete being used frequently in such work. Substantial stations similar to those used by steam railroads are located at the various cities and towns along the route, and smaller stations have been erected every few miles between towns to afford protection to the traveling public from inclement weather.

About twenty-five miles south of Minneapolis, at Orchard Gardens station, several thousand acres of farm land have been divided into five and ten acre tracts by the company and are being sold to residents of Minneapolis and St. Paul, many of whom have erected houses and travel to and from their places of business in the city each day on the company's trains.

Many attractive lakes lie along the route, affording excellent facilities for boating, bathing and fish-



ROLLING STOCK FOR DAN PATCH LINES. Height from track to underside of side sills, 3 ft. 7 $\frac{3}{4}$ in.; underside of side sills over roof, 8 ft. 11 $\frac{1}{2}$ in.; floor to center of headlining, 8 ft. 2 $\frac{1}{2}$ in.; track to step, 18 $\frac{1}{8}$ in.; risers, 10 $\frac{3}{8}$ in.; weight of body, complete, 32,040 lb.; trucks, 16,640 lb.

ing, and these have lured thousands of city dwellers out into the open country during the summer months, many of them having cottages where they spend the entire season.

Antlers Park, a summer resort and recreation park, thirty miles south of Minneapolis, is owned and operated by the traction company. It has many attractions, including a club-house, dancing pavilion, excellent bathing beach, chute-the-chutes, aerial swing, scenic miniature railway, and all the other attractions usually found at a popular summer resort. Many people spend the entire summer in the cottages, and numerous excursion parties are entertained at the park during the season.

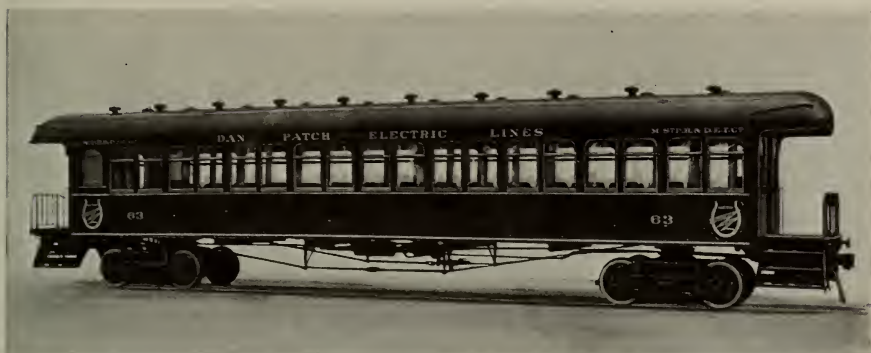
Four through trains each way,

daily, one of which is a limited parlor car train, constitute the normal passenger schedule of the road, the limited making the run of 107 miles, including four stops, in three hours and twenty-five minutes; the other trains requiring four hours and five minutes for the same trip. This service is supplemented by local trains between certain points of the line and the terminals, and by excursion trains during the summer season as occasion requires.

One 72-ft. gas-electric car, with a seating capacity of 87, constitutes the normal train; when traffic is somewhat heavy, a trailer is added to this; and for excursions and extra heavy traffic a train made up of trail cars, like those described in this article, and drawn by a 60-



ROLLING STOCK FOR DAN PATCH LINES. These unusually long combination cars were built by the Wason Manufacturing Company and equipped with the General Electric Company's gas-electric system of operation



ROLLING STOCK FOR DAN PATCH LINES. Twelve all-steel framed trail cars and steel trucks were built by The J. G. Brill Company

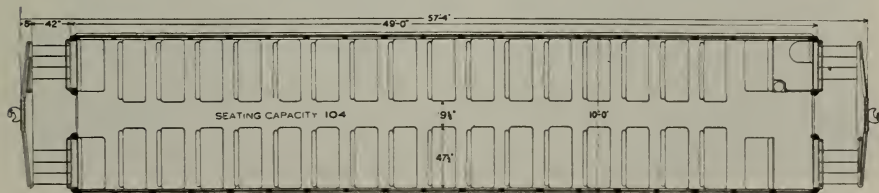
ton gas-electric locomotive, is used.

The twelve trail cars recently received from The J. G. Brill Company are built on an all-steel underframe, the principal members of which are two 6-in. I-beam center sills extending from bumper to bumper, reinforced at each end to a point 3 ft. back of the bolsters by plates riveted to each side of beam; 6-in. channel side sills; channel crossings; oak end sills, reinforced with steel plates on the inside; five pairs of diagonals between bolsters, gusseted to side sills; 6-in. x $\frac{3}{8}$ -in. plate diagonals from center of bumpers to top of bolsters just inside of the side sills; 6-in. I-beam needle beams and $1\frac{1}{4}$ -in. wrought iron truss rods.

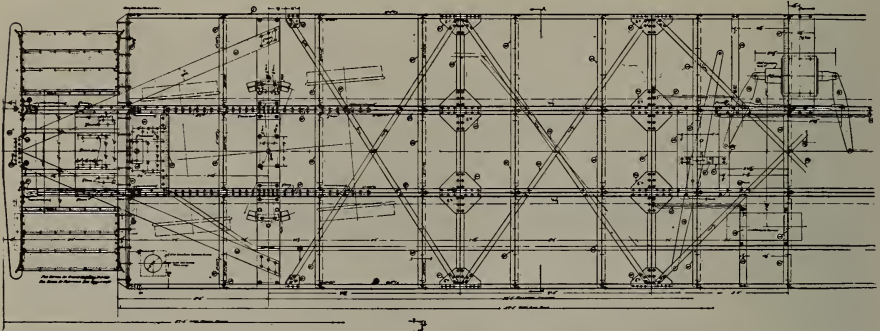
The upper framing is composed

of composite corner and side posts of 2 x 2 x $\frac{1}{4}$ -in. tees and ash, and sheathed on the outside with No. 10 sheet steel; the roof, which is of No. 16 galvanized sheets, is supported on steel rafters of $1\frac{1}{2}$ x $1\frac{1}{2}$ x 3-16-in. tees riveted to a $3\frac{1}{2}$ x $2\frac{1}{2}$ x 5-16-in. steel angle top rail on each side. The side windows are of the double type, with stationary upper sash, and with lower sash arranged to raise.

The interior finish is mahogany, with whitewood ceilings. The reversible seats are 47 $\frac{1}{2}$ inches over all, with 19-in. spring backs and spring edge cushions upholstered with plush; stationary corner seats; oxidized bronze trimmings and parcel racks extending full length of cars; one toilet room in



ROLLING STOCK FOR DAN PATCH LINES. Height from track to underside of side sills, 3 ft. 6 $\frac{3}{4}$ in.; underside of side sills over roof boards, 12 ft. 7 $\frac{5}{8}$ in.; floor to center of headlining, 8 ft. 2 in.; track to step, 18 $\frac{1}{2}$ in.; risers, 10 $\frac{1}{2}$ in.



ROLLING STOCK FOR DAN PATCH LINES. All-steel underframe of the passenger trail cars

corner and a water-cooler in alcove outside of each. The cars are mounted on trailer type trucks having a 6-ft. wheel base, 33-in. wheels and $4\frac{1}{4}$ x 8-in. journals.

The gas-electric cars built by the Wason Manufacturing Company are of the General Electric Company's standard combination passenger, smoking and baggage



ROLLING STOCK FOR DAN PATCH LINES. Interior of the trail cars. The passenger compartments of the gas-electric motor cars have the same appearance. The seats accommodate three passengers each and provide the trail cars with a seating capacity of 104



ROLLING STOCK FOR DAN PATCH LINES. Length over end sheathing, 37 ft. 2¼ in.; centers of side posts, 5 ft. 0 in.; width over sills, including sheathing, 9 ft. 2¾ in.; width over eaves, 9 ft. 7½ in.; height from track to underside of side sills, 3 ft. 7½ in.; underside of side sills over roof, 10 ft. 2 in.; weight of body, 25,500 lb.; trucks, 14,000 lb.

compartment type, and are handsomely finished in mahogany. The transverse seats are of sufficient length to accommodate three persons, and are upholstered with plush in the passenger compartment and with leather in the smoking compartment. The total seating capacity is 87 persons.

The all-steel under-frame consists of 7-in. I-beam center sills spaced 3 feet from center to center and reinforced over rear truck by 6 x ¾-in. plates riveted to each side of sill, and braced by 6 x ⅜-in. plate diagonals from center of bumper back to bolster; 7-in. channel side sills, reinforced at the forward end by a steel plate extending from the bolster to a point beyond the first pair of queen posts, to compensate for the interruption of the belt rail by the baggage compartment doors; channel crossings; five pairs of angle diagonals gusseted to side sills; 7-in. I-

beam needle beams; and 1¾-in. truss rods.

The upper structure is made up of 2 x 2 x ¼-in. T-posts sheathed on the outside with steel. The plain arch roof is supported on steel rafters, together with the usual wooden car lines. The motor truck has a 6-ft. 10-in. wheel base; 33-in. wheels; 5½ x 10-in. journals; and is equipped with two 100-hp. motors. The rear truck has a 6-ft. wheel base, 33-in. wheels and 5 x 9-in. journals.

The freight cars are 40-ton, 36-ft., box cars with a steel under-frame, the principal members of which are center sills of 15-in. 33-lb. channel, spaced 127/8 inches apart and reinforced with 5-16-in. cover plate and ¼-in. bottom plate; side sills of 12-in. 20½-lb. channel, reinforced with 3 x 3 x ¼-in. angle; end sills of 12-in. 20½-lb. channel, reinforced at center by a malleable iron striking plate;

bolsters built up of $\frac{1}{2}$ -in. web plates, reinforced at top and bottom with $4 \times 3 \times \frac{3}{8}$ -in. flange angles on both sides, $14 \times \frac{5}{8}$ -in. bottom plate and $14 \times \frac{1}{2}$ -in. top plate, with cast steel center plate and malleable iron side bearings; crossings built up of $\frac{1}{4}$ -in. web plates and $6 \times \frac{1}{4}$ -in. tie plates; intermediate floor support of channels connected to side and center sills by 3×3 -in. steel angles; yellow pine flooring shipped to MCB standard section.

The upper structure has yellow pine posts, girths and plates, sheathed and lined with boards of

the same material, and tied securely together with $\frac{3}{4}$ -in. tie rods; the roofing is of yellow pine boards extending from side plates to ridge pole of same material, which is supported on pressed steel carlines and secured to end plates at both ends of car; corrugated iron inside metal roof; solid sliding side doors, with track and fasteners of standard type.

The cars are all fitted with MCB automatic couplers with 5×7 shank and $8\frac{1}{2}$ -in. ends, and mounted on trucks having a 5-ft., 4-in. wheel base, 33-in. wheels and 5×9 -in. journals.

COMBINATION PASSENGER AND BAGGAGE CARS FOR THE ORLEANS-KENNER RAILWAY, LOUISIANA

BRILL 27-MCB2X TRUCKS

THE Orleans-Kenner Electric Railway is a new interurban line running northwest from New Orleans along the east bank of the Mississippi River to Kenner, a distance of 16 miles, and has as its future objective Baton Rouge. Three steam railways have furnished the transportation through this fertile belt, and have built up a populous territory, opening the way for the electric interurban system which, with its more frequent service and stopping at any point of the line, will enable patrons to reach the terminal points and the intermediate towns with greater convenience than heretofore.

The line commences at the center

of the business district of New Orleans, with the terminal at Canal Street and University Place, and runs through wide avenues to the city boundaries over the tracks of the New Orleans Railway & Light Company. From that point the road runs on its own tracks located on its own right-of-way, a strip of land 30 ft. wide with a public highway on either side, and traverses the section of high land between the Mississippi River and Lake Pontchartrain. This land is from one to three miles wide and is composed of rich alluvial soil and is all in a high state of cultivation. The lines follow the bends of the Mississippi River at a distance of 1,000 to 2,000 ft. from the Levee. As the



CARS FOR ORLEANS-KENNER RAILWAY. Four of these combination cars, comprising the initial equipment of the new line, were built by the American Car Company and mounted on Brill 27-MCB2X Trucks

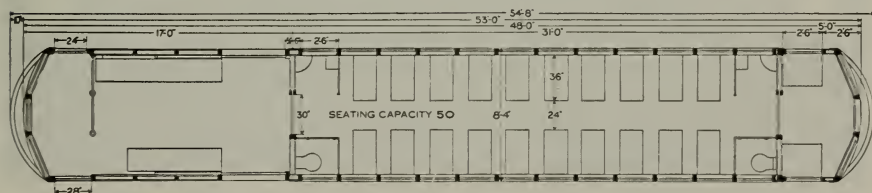
land is nearly level for the whole distance, and as there are no streams or marshes, there are no bridges or embankments on the entire system.

The track is laid with 70-lb. rail and the roadbed is ballasted with cinders and gravel. The overhead construction is catenary type with steel brackets and messenger wire and standard construction throughout. At Harahan City is located the sub-station which has two 200 kw. rotary converters of 1200 volts dc. operation. The current is supplied at 6600 volts by the New Orleans Railway & Light Company.

The principal industries of the

region, aside from market gardens which supply New Orleans, are in the railroad shops, fertilizer factories, creosoting plants, saw mills and box factories. Outside of New Orleans, the population tributary to the line to Kenner is 4,000. Three cars will be used in normal operation, and a fourth for special occasions. The running time will be one hour, and the average number of stops will be eight passenger and four crossings, and the cars will be operated singly or in trains, as occasion requires. In summer the traffic will be considerably supplemented by amusement grounds reached by the lines.

The initial rolling stock consists



CARS FOR ORLEANS-KENNER RAILWAY. Height from track to underside of side sills, 3 ft. 6 in.; underside of side sills over trolley boards, 9 ft. 0½ in.; floor to center of headlining, 7 ft. 10½ in.; track to step, 16½ in.; step to platform, 35 in.

of four combination passenger and baggage cars, built by the American Car Company. The cars are constructed on a steel underframe composed of sills built up of an angle with the flange extending upwardly, a steel plate and a reinforcing angle over the bolster at the baggage car end, and reaching well back of the baggage car door; 6-in. I-beam center sills and intermediate sills extend from bumper to bumper, and channel crossings connected to the sills with corner brackets.

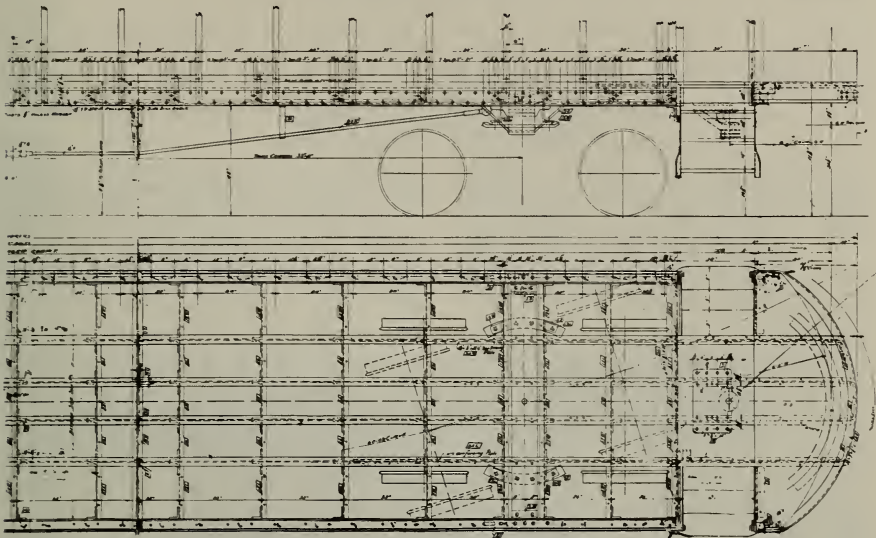
The side construction is reinforced by $1\frac{1}{4}$ -in. undertruss rods bearing against queen posts extending from I-beam needle beams.

The top plate of the open built-up bolsters is 10 by 1 in., and the bottom plate 10 by $1\frac{1}{4}$ in.

The upper construction is of wood, with the exception of the side and vestibule sheathing, which is of No. 14 steel. The corner posts are of $3\frac{1}{2}$ -in. oak, and side posts of $2\frac{3}{4}$ -in. oak. The posts are mortised into a yellow pine sill resting on the outward extending flange of the side angle and strap-bolted through. The Brill plain arch roof is supported on steel rafters $\frac{5}{8}$ in. thick bolted to the top rails through a foot forged at each end. These rafters are concealed between wooden carlines, which with intermediate carlines supply means



CARS FOR ORLEANS-KENNER RAILWAY. Main compartment, looking towards baggage compartment. Upper sashes stationary and framed in a continuous piece. Lower sashes raise full height



CARS FOR ORLEANS-KENNER RAILWAY. All-steel underframe and oak side and corner posts

for attaching the roof boards.

The interiors are simply but attractively finished in ash, the light natural color of the wood aiding to produce a bright appearance. Below the window rail the sides have an inside lining of No. 14 sheet steel painted the same color as the interior woodwork. In the main compartment the ceiling is of composition board painted a light color and neatly decorated, and in the baggage compartments the ceilings are of carline finish. Double-sash side windows have the top sash stationary and framed in a continuous piece extending the full length of the passenger compartment. The bottom rails of these sashes, therefore, assist in strengthening the post construction. The lower sashes raise their full height, and can be held open at various points. Each end of the car is provided with two drop sashes and a train

door in the center. At the four corners are triple steps, and the step openings are enclosed with the builder's type of step trap.

Brill "Winner" seats are used in the main compartment, and folding slat seats in the baggage compartment. On the backs of the seats are a pair of sockets for holding signs designating the section of the car to be occupied by colored people. At each end of the main compartment are toilet rooms, opposite to which is a compartment, without door, containing a wash stand and water cooler. This compartment is provided with continuous parcel racks, and push buttons are installed at each side post.

The cars are mounted on Brill 27-MCB-2X trucks, which are capable of a speed of 50 miles per hour. They have a wheel base of 6 ft. 6 in., and are spaced at 33-ft. centers.

CENTRIFUGAL SPRINKLING CAR FOR ITHACA, N. Y.

2500-GALLON CAPACITY

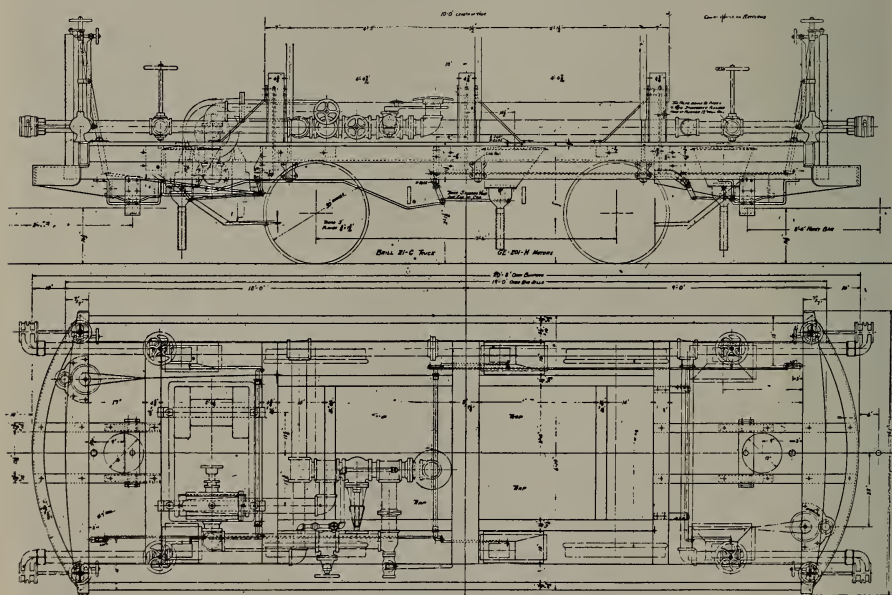
AT Ithaca, N. Y., the streets within the city limits occupied by the tracks of the Ithaca Traction Corporation are being flushed thrice weekly by a combination centrifugal sprinkler and flusher of 2,500 gallons capacity, which was recently built for them by The J. G. Brill Company.

About eleven miles of street, varying in width from 36 to 41 feet, are thus served, six miles of which are paved and the balance unpaved right of way.

The corporation has an arrangement with the city under which

they are to flush all paved streets every Tuesday, Thursday and Saturday between the hours of six and nine in the morning. During the dry summer months the unpaved streets are to be sprinkled, and it is anticipated that during the hot midsummer season the paved streets will require sprinkling during the day, in addition to the flushing administered early in the morning.

For this service the traction corporation is paid by the city at the rate of 20 cents per car mile, which is approximately the cost to the corporation of such operation, in-



CENTRIFUGAL SPRINKLING CAR FOR ITHACA. Length over end sills, 19 ft. 0 in.; width over sills, 6 ft. 10 in.; extreme width, 7 ft. 2 in.; from track to underside of side sills, 2 ft. 1 1/2 in.; underside of side sills over trolley boards, 8 ft. 8 in.; track to step, 18 1/2 in.; step to platform, 18 in.

cluding depreciation of equipment and interest on the capital invested.

The city, which supplies all water, proposes to install special water connections at convenient points close beside the tracks, so that the water may be taken into the tank through a short hose, thus obviating the traffic congestion

the front flushing head to wash a section of pavement extending from the track to about midway between the rails and the curb line; a forward stream from the rear flushing head then washing from the midway point to the curb, thus completing the work begun by the stream at the front of the car.

About one-half of the city of



CENTRIFUGAL SPRINKLING CAR FOR ITHACA. Pressure for sprinkling and flushing is obtained by a direct-connected motor-driven centrifugal pump on platform. Mounted on Brill 21-C Truck

sometimes caused by stretching the intake hose across the street from the car to the fire hydrant at the curb as at present, and preventing the wear and tear on these hydrants resulting from the frequent opening and closing of their valves required for sprinkling purposes.

Flushing one side of the street at a time has been the method found most suitable by the traction corporation. This is accomplished by directing a stream forward from

Ithaca lies on a flat plain at the head of Cayuga Lake; the remainder, of which Cornell University comprises a conspicuous part, occupies the side and top of a picturesque and very steep hill rising about 450 feet above the lower city level. This elevation is negotiated by street cars in a distance of one to one and a half miles, the grades varying from 6 to 11 per cent.

Because of these grades, a single truck sprinkler was decided upon, equipped with hand and air brakes

and with a sand box at each of the four corners of the car.

The car is built on an underframing of long-leaf yellow pine double side sills, $5\frac{1}{2}$ in. x 10 in. and $2\frac{1}{4}$ x $4\frac{3}{4}$ in. The end sills are 7 in. x 7-in. oak, and the crossings are of the same material, $4\frac{3}{4}$ in. x $7\frac{1}{4}$ in., excepting the one in the center which is 8 in. x $7\frac{1}{4}$ in., and bears the major part of the weight of the tank, which is of steel, 10 ft. long and 6 ft. 6 in. in diameter, resting on three oak cradles on a flooring of 3/16-in. narrow yellow pine boards attached securely to the underframing.

The discharge apparatus consists

of a single pipe leading from the bottom of the tank to a motor-driven centrifugal pump on the platform at one end of the car, from which a direct piping connection is made above the floor to four adjustable sprinkling heads, one at each corner of the car. An adjustable flushing head is located close to the pavement below each side of both platforms and connected to the piping by a two-way valve back of the sprinkling heads.

The car is mounted on a Brill 21-C truck having a wheel-base of 7 ft. 6 in. and equipped with 30-in. wheels, and Brill "Wide-wing" journal boxes.

BULLETIN 216—SINGLE-TRUCK CARS

IN many parts of the United States much attention is being given at present to the single-truck car as a means of increasing returns through more frequent and faster schedules. This interest is manifested by operators of large as well as small city systems.

There is no doubt that single-truck cars are producing and can effect greater efficiency and, at the same time, greater economy of operation in many quarters. Conservative figures furnished by railway operators show that a substitution of single-truck for double-truck cars will prove a profitable investment under a wide range of operating conditions whether the cars are operated by crews of two or one. Of course, where one-man operation is feasible, the cost per car mile is materially reduced.

Lighter cars mean lighter rails and lighter equipment throughout; they also reduce the cost of power installation. With existing property they prolong life to the rails and make less demand on the power plant; operating and maintenance costs are reduced all along the line.

From the number of single-truck cars being furnished, from the volume of inquiries received and the wide interest in the subject, it would appear that the adoption of short, light cars for supplementary service will soon be quite general.

Bulletin 216, just published, shows representative types of single-truck cars ranging from 18 to 23 ft. over the body corner posts, and weighing from about 5,000 to 10,000 lb. per body.



THE J.G. BRILL COMPANY

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G.C. KUHLMAN CAR CO., CLEVELAND, OHIO
JOHN STEPHENSON CO., ELIZABETH, N. J.
WASON MANFG. CO., SPRINGFIELD, MASS.
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AGENCIES

PACIFIC COAST—Pierson, Roeding & Co., 118
New Montgomery Street, San Francisco; Los Angeles,
Seattle

AUSTRALASIA—Noyes Brothers, Melbourne, Sidney,
Dunedin, Brisbane, Perth

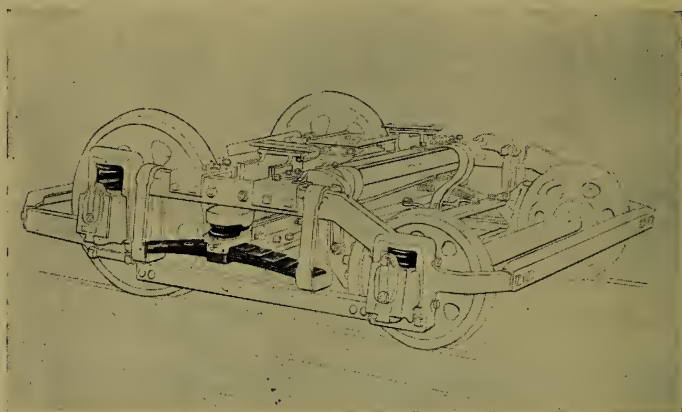
BELGIUM AND HOLLAND—C. Dubbelman, 48
Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—Shackleford &
Co., Calle Bartolome Mitre 478, Buenos Aires

NATAL, TRANSVAAL AND ORANGE RIVER
COLONY—Thomas Barlow & Sons, Durban, Natal

CHINA—Shewan, Tomes & Co., Hong Kong, Canton,
Shanghai

ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan



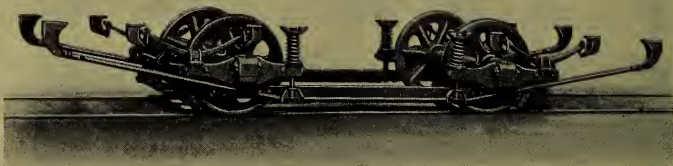
GRADUATED SPRING SYSTEM

WHEN a car mounted on Brill 39-E Trucks has less than a full load of seated passengers, the bolster coil springs are in action and give a remarkably smooth motion to the lightly-loaded body. Under a heavier load, the bolster coil springs cease motion entirely, as the compression of the springs, $\frac{3}{8}$ in., brings the bolster and spring-seat castings in contact; after that the semi-elliptics do the work. The journal springs cushion the frame at track crossings and furnish whatever equalization is necessary. As cars usually run with a light load most of the time, graduating the bolster springs for light and heavy loads is immensely important. All Brill pivotal city trucks have the Graduated Spring System.

THE J. G. BRILL COMPANY, PHILADELPHIA

BRILL MAGAZINE





THE BRILL 74 TRUCK

THIS truck is light enough for trailer service and strong enough for use with motors, and was designed primarily to provide the same easy-riding features of the Brill 21-E Truck at greatly reduced weight. The chief distinguishing characteristic is the type of journal box employed, which is cast with extensions to support a body coil spring at one end and a semi-elliptic at the other. The journal boxes are arranged to be interchangeable. Channel steel end frames connect each pair of journal boxes together, and the boxes are kept in proper alignment by a bar at each side of the truck and attached to the boxes with bolts, which permit a desirable amount of flexibility and also provide for adjustment. The brake rigging is arranged with a center-pull vertical lever and includes the Brill Half-Ball Brake Hanger. The 74 Truck has been in use for nearly two years and has won its place as a standard Brill type by its excellent riding qualities under a wide range of operating conditions of several prominent railway systems.



Pr Jones

GENERAL MANAGER, PITTSBURGH RAILWAYS COMPANY

AUGUST 15, 1915

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P. N. JONES

P. N. JONES, General Manager of the Pittsburgh Railways Company, was born near Springfield, Ohio, February 15, 1865. He graduated in 1892 from the Ohio State University with the degree of M. E. in E. E. and immediately entered the electric railway field as a member of the Construction Department of the Short Electric Railway Company of Cleveland. One year later he joined the staff of the Lincoln Electric Company of Cleveland, where he was chiefly occupied in experimental work. In 1904 he went with the Westinghouse Electric & Manufacturing Company of Pittsburgh, first in the Testing Department and then successively as Superintendent of Pittsburgh City Construction, Manager of the Cleveland Sales Office, and Manager of the Pittsburgh Sales Office. He resigned from the Westinghouse Company to become, on October 1, 1905, Electrical and Mechanical Engineer of the Pittsburgh Railways Company, with entire supervision of power-stations and equipment. After serving in this capacity for four years he received the appointment of General Superintendent and was made General Manager in 1912. The Pittsburgh Railways comprises a system of 600 miles of trackage with an equipment of 1300 passenger motor cars and 150 trail cars. Mr. Jones is widely known for his important work in weight reduction of cars and in successful solutions of operating problems through mechanical improvements. He is a member of the Engineer's Society of Western Pennsylvania and an associate member of the American Institute of Electrical Engineers.

INTERURBAN CENTERS AND INTERURBAN CARS

MINNEAPOLIS

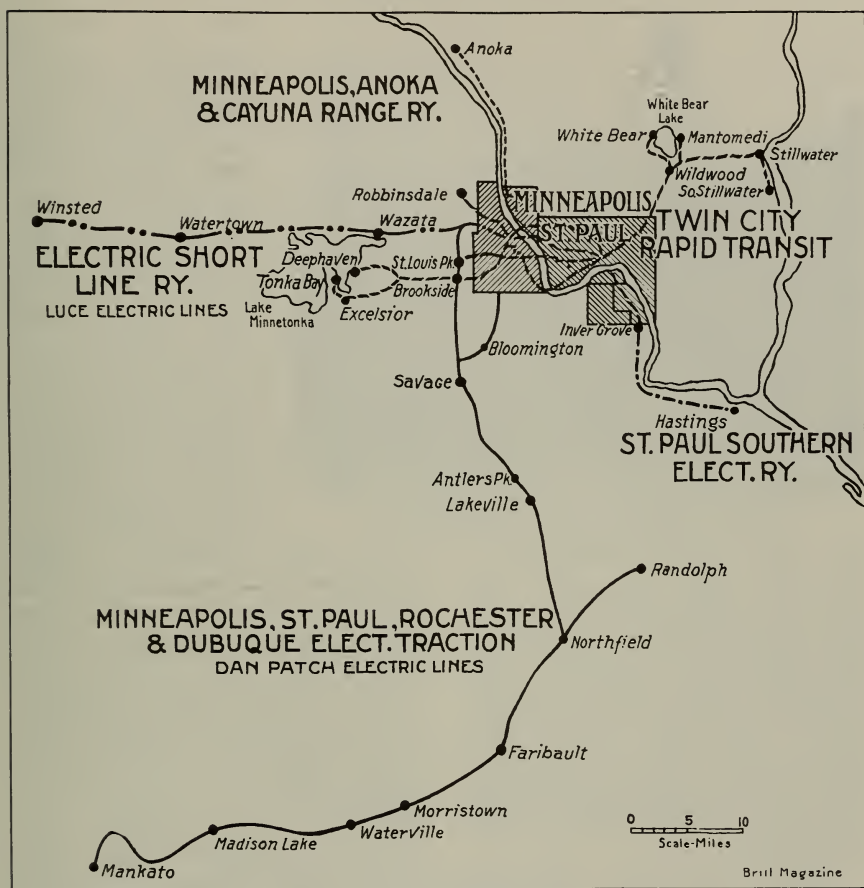
THE southern part of the State of Minnesota consists of rolling prairie land averaging 1,000 ft. above the sea level. In the northeastern part of this section of the State is Minneapolis, built on comparatively level ground on each side of a gorge through which flows the Mississippi River. St. Anthony's Falls in the river at the center of the metropolis is largely responsible for the city's wealth and commercial greatness, for it supplies 40,000 hp. to the greatest flour mills in the world. Minneapolis has a population of 353,000, and St. Paul, whose boundaries adjoin, has a population of 276,000.

The climate is healthful and invigorating, not too cold in winter to be uncomfortable and free from excessive heat in summer. The city has a number of lakes within its boundaries, and large and small lakes are frequent in its vicinity; notwithstanding this there are no swamp lands in the entire region. Agriculture is and always will be the main source of wealth of the district, with wheat as its chief staple; however, the State is the largest producer of iron ore, and furnishes over one-third of the entire supply mined in the United States. Lumber and cattle raising are also among its principal industries.

The Minneapolis Street Railway Company and the St. Paul City

Railway Company, both subsidiary companies of the Twin City Rapid Transit Company, operate the local railway systems in the two cities and jointly operate the inter-city lines. Of the latter the "Minneapolis & St. Paul Line" is the most direct between the two cities, and its route is lined with business houses the entire distance of 10 miles. The running time is 50 minutes, and the service consists of a 4-minute all-day headway with a 2-minute rush-hour headway. The local lines of both cities have been laid out as radial systems and are nearly all through-routed through the business center of the city from one residential section to another.

Another subsidiary of the Twin City Rapid Transit Company, the Minneapolis & St. Paul Suburban Company, operates a number of suburban lines out of the Twin Cities. An important part of this system is a double-track line running from Minneapolis 18 miles to Excelsior on Lake Minnetonka with a single-track extension of 3 miles to Tonka Bay. Excelsior is a town of 1,000 population. There is also a single-track branch from Deephaven Junction to Deephaven, another point on the lake. The principal business of these lines comes during the summer when many people leave the city to live out on this beautiful lake with its succession of bays and inlets and



numerous islands. The summer week-day schedule provides a half-hourly service to Excelsior, an hourly service to Tonka Bay and a train every two hours to Deephaven. The run to Excelsior is made in 46 minutes, the same length of time to Deephaven and to Tonka Bay in 55 minutes, but of this 24 minutes are consumed in the $5\frac{1}{2}$ -mile run to the city limits. There is a separately half-hourly service to Hopkins, a manufacturing town of 3,000 population,

about $9\frac{1}{2}$ miles from the center of Minneapolis on this line, and additional service is required during the morning and evening rush hours. On Sundays and holidays trains are operated frequently on 15 and sometimes on 10-minute headways. The winter service to Lake Minnetonka points is approximately half of that in the summer.

The company operates a fleet of seven express boats on Lake Minnetonka, which correspond in win-



INTERURBAN CENTERS AND CARS. Double-track bridge on the Minnetonka Division of the Twin City Rapid Transit over the Minneapolis & St. Louis Railroad

dow and seating arrangements to the cars. This boat service has been one of the main factors in creating business for the Minnetonka Division and enables people to live at points that would otherwise be inaccessible. The boats are 70 ft. long, have a speed of 12 miles an hour, and are operated on an hourly schedule over a routing of 22 miles.

A single-track line of 25 miles

extent is operated from St. Paul through the town of North St. Paul, touching Wildwood at the lower end of White Bear Lake and continuing on to the city of Stillwater. The trip to Wildwood is made in 47 minutes and to Stillwater in 1 hour and 9 minutes; of this time 19 minutes are taken in running 3 miles to Duluth Avenue, where suburban operation begins. There is a short local line in Stillwater with a $3\frac{3}{4}$ -mile extension to South Stillwater. There are also branch lines running up the sides of White Bear Lake. Stillwater has a population of 10,000; the town of South Stillwater, 2,000, and White Bear, 2,000. Trains run every half hour from St. Paul to Stillwater, and each train has a section giving service to points on White Bear

Lake alternately along the east and west shores.

The company owns and operates a small but attractive amusement park at Wildwood, 12 miles from St. Paul, and White Bear Lake offers opportunities for all kinds of water sports and the company maintains there a large dancing pavil-



Under-grade crossing, at Brookside, of the Minnetonka line with the Dan Patch Electric Lines

ion and restaurant.

Both the Minnetonka and Stillwater Divisions are operated under the control of train dispatchers, with the dispatching done by telephone. Trains on all suburban lines are composed of one or more sections of single cars; the heavy traffic on Sundays usually require 5 or 6 sections and there are numerous instances when there are as many as 14 or 15 sections to one train. On the Minnetonka line, where a maximum speed of 60 miles per hour is operated on double-track, sections of trains must maintain a distance of 3,000 ft. apart. On the Stillwater Division, where the line is of single-track, this high speed is not obtained and sections maintain a distance of 2,000 ft.; the sections, of course, close up when stopping for stations, the stations averaging about 1 mile apart.

All trains for Minnetonka points run "Limited" as far as Hopkins. Outbound suburban trains stop only at certain points in the city limits and interurban trains make regular local stops inside the city.



INTERURBAN CENTERS AND CARS. View on the 18-mile double-track line between Minneapolis and Lake Minnetonka

The Twin City Rapid Transit Company also operates two small suburban lines, which have been joined together and through-routed, known as the "Robbinsdale-St. Louis Park Line." From Robbinsdale through the business district of Minneapolis to St. Louis Park is $11\frac{3}{4}$ miles, and most of



Type of waiting station on the Minnetonka line

this line is within the city limits and operates over the trackage of the local lines. Another short line runs from St. Paul through the city of South St. Paul to the village of Inver Grove, a distance outside of the St. Paul boundary of 6 $\frac{1}{3}$ miles, 2 of which is single-track. Both of these lines are operated on dispatchers system.



INTERURBAN CENTERS AND CARS. Train at meeting point on Stillwater Division of Twin City Rapid Transit system

All of the suburban tracks of the Twin City Rapid Transit Company are laid with 80-lb. T-rail. The voltage of the suburban as well as the local lines is 600 dc. For the Minnetonka Division there are 800-kw. substations at Excelsior and Hopkins. The Stillwater Division has an 1,800-kw. station at Wildwood and a 1,200-kw. station at Stillwater. The transmission lines run from the main steam turbine and hydroelectric stations at St. Anthony's Falls, where the power is generated at 35 cycles ac. 2,300 volts and raised to 13,000 volts for transmission.

During 1914 the Minnetonka Division carried 4,460,895 cash passengers and operated 789,332 car miles. The Stillwater Division carried 5,145,910 cash passengers and operated 1,021,580 car miles. The four inter-city lines between Minneapolis and St. Paul carried 50,329,372 cash passengers and 21,291,424 transfer passengers.

These lines operated 8,429,521 car miles.

The standard type of car operated on the Minnetonka, Stillwater, Robbinsdale-St. Louis Park, and South St. Paul and Inver Grove lines is 46 ft. $9\frac{5}{8}$ in. over the bumpers, 33 ft. $9\frac{1}{8}$ in. between bulkheads, and is 9 ft. $2\frac{1}{2}$ in. over the sides. The seats are all placed transversely and furnish a capacity for 50 passengers per car. These cars, like the city cars of the company, have the "Minneapolis Safety Gate" of wire mesh and operated in pairs by the motorman. The cars have plate girder sides, I-beam center sills and side sills reinforced with steel angles. The trucks have a 6-ft. wheel base, 4-motor equipment of 75 hp. each and type M control. The lights used at night indicate the class of train and whether or not another section is following. Total weight of car and equipment, 60,400 lb.

The cars used on the four inter-

city lines are 46 ft. 8 in. over the bumpers, 33 ft. 7 $\frac{3}{4}$ in. between bulkheads and 9 ft. 1 in. over the sides. The general construction is similar to the suburban car except that it is lighter. The seating arrangement consists of 7 cross seats and one long longitudinal seat on each side, furnishing a seating capacity of 48. The trucks have 6-ft. wheel base and are equipped with four 40 hp. capacity motors per car. Total weight of car and equipment is 41,700 lb.

The miscellaneous equipment of the suburban lines consists of a baggage and express car, operated on the Minnetonka Division, which makes two trips per day during the summer and one trip during the winter for the convenience of patrons rather than with the idea of developing business. The Minnetonka and Stillwater Divisions each have a special work car, special wire car, and a snow plow.

The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company is called "Elec-

tric Traction Company," although steam locomotives are used to handle freight trains and the passenger cars are hauled by gas-electric motor passenger cars and by gas-electric locomotives; therefore, the operation does not come under the term "Electric Traction" as generally accepted and which assumes the use of an electrical distribution system and by locomotive power units not of the prime mover type.

The system is popularly known as the Dan Patch Electric Lines and extends south from the company's terminal at Minneapolis, a distance of 107 miles, to Mankato, with a branch about midway running 7 miles northeast from Northfield to Randolph. The route traverses a rolling country with a large number of beautiful lakes close to the lines. The principal points and their population are as follows: Richfield, 3,074; Bloomington, 1,191; Northfield, 3,287; Faribault, 9,811; Waterville, 1,278; Mankato, 10,365. These with nu-

merous smaller towns and villages have a combined population of 30,633 and the rural population tributary to the lines is 12,974, making a total of 43,607 immediately tributary to the system and outside of the city of Minneapolis.

The Dan Patch Electric Lines and the Luce Electric Lines share a com-



INTERURBAN CENTERS AND CARS. Express boats at Wild-hurst Dock, Lake Minnetonka, en route to Zumbra and Wayzata



INTERURBAN CENTERS AND CARS. Gas-electric motor passenger car and trailer on the Dan Patch Lines at typical station on division between Minneapolis and Northfield

modious terminal near the intersection of 7th Street and Second Avenue, two blocks west of Hennepin Avenue and in the heart of the business section of the city. The property is of ample area for the passenger, freight and express business and its central location is highly advantageous. It is said to be the only interurban terminal which has entrance through the city on private right-of-way.

From Randolph to Mankato the line is leased from the Chicago

Great Western Railroad Company and the balance from 54th Street, Minneapolis, to Northfield has been constructed in accordance with modern steam road standards. With the exception of a 3½-mile double-track section between Luce Line Junction and 7th Street Terminal, Minneapolis, the entire system is of single-track. The line between Minneapolis and Northfield has been made almost level throughout the entire distance by grading, and the bridges and other

line construction work are of heavy and permanent character.

It is planned to extend the system south from Faribault, branching in several directions and including a main line to Rochester and Dubuque. This will more than double the mileage of lines operated at present.



INTERURBAN CENTERS AND CARS. Interlocker and waiting station on Dan Patch Lines at Lakeville



INTERURBAN CENTERS AND CARS. The Dan Patch station at Faribault is located at the center of the business district of this town of 10,000 population

The summer time-table shows three through trains daily each way between Minneapolis and Mankato; two of these trains make all stops and one is a limited, making no stops between Minneapolis and Northfield and three stops between Northfield and Mankato. The running time of the through accommodation trains is 4 hours and the limiteds, which leave Mankato at 7 A. M. and Minneapolis at 5 P. M., make the trip in 3 hours and 25 minutes. The service is supplemented by local trains running between Minneapolis and Faribault and two trains daily each way on the Northfield - Randolph Branch.

All gas - electric motor passenger cars are arranged for single-end operation and the gas-electric locomotives are operated from both ends. The regular passenger service has heretofore been con-

ducted with single gas-electric motor cars and occasionally trailers drawn by the passenger motor cars; for special service, such as excursions, a gas-electric locomotive drawing trail cars is used. The growth of the business, however, is calling for more cars and in the near future the gas-electric cars will be regularly operated with trailers.

The freight traffic of the lines is mainly carload business and consists of manufactured products, merchandise, grain, and a small amount of market garden products. A considerable amount of milk is



INTERURBAN CENTERS AND CARS. Gas-electric locomotive and freight cars at the Dan Patch freight terminal at Minneapolis. The company's auto-trucks furnish quick transportation of material to all parts of the city



INTERURBAN CENTERS AND CARS. Standard type of gas-electric motor passenger car of Dan Patch lines. Length over ends, 71 ft. 3½ in.

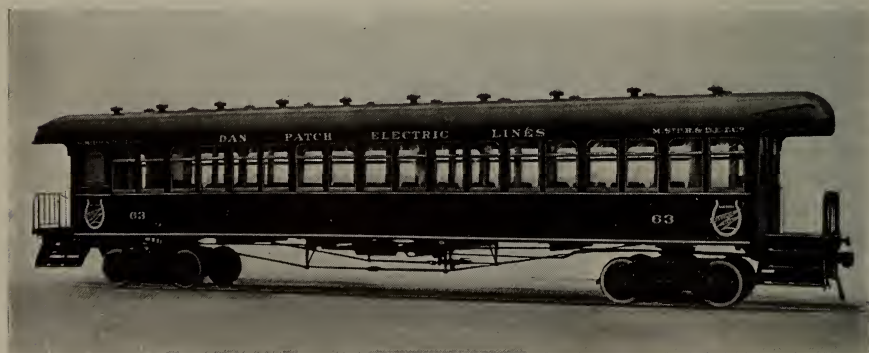
transported into Minneapolis from the outlying districts.

For the ten months ending April 30, 1915, the cars carried 356,444 revenue passengers and operated 289,623 revenue passenger car miles. The express and freight revenue car miles for the same period totaled 56,158.

About 25 miles south of Minneapolis, at Orchard Gardens station, several thousand acres of farm land have been divided into five and ten-acre tracts by the company and are being sold to residents of Minneapolis and St. Paul, many of whom have erected houses

and travel to and from their places of business in the city each day on the company's trains. Antler's Park, a summer resort and recreation park, 30 miles south of Minneapolis, is owned and operated by the company and has been made very popular with many attractions and is an excursion point which draws crowds throughout the season.

The rolling stock of the Dan Patch Electric Lines consists of 10 gas-electric motor passenger cars, all of which with the exception of one have gas engines rated at 200 hp.; one has a gas engine rated at



INTERURBAN CENTERS AND CARS. Twelve of these all-steel-frame trail cars were recently built by The J. G. Brill Company. Seating capacity, 104; length over bumpers, 57 ft. 4 in.; length over body, 49 ft.

125 hp. One gas-electric motor passenger car is fitted up as a club car and used as a limited, making one round trip between Minneapolis and Mankato daily. These cars are of all-steel construction and the latest built are 71 ft. 3½ in. over the ends, have a seating capacity of 87 and a 12-ft. baggage compartment. Four gas-electric

locomotives of the type illustrated are used for hauling passenger cars and are equipped with the General Electric Company's system and type 215-D 100 hp. motors, four motors to each of the electric locomotives and two to the motor passenger cars. Nineteen passenger trailer cars are employed on the system and are of the type illustrated on page 234, the latest cars furnished having a seating capacity of 104. These cars are built on all-steel underframes and were described, together with gas-electric cars, in the July, 1915, issue of BRILL MAGAZINE. Other equipment consists of one mail car, one baggage car, 147 freight box cars, 15 freight flat cars, 6 refrigerator cars, one gondola car, one milk car, three 115,000-lb. steam locomotives.



INTERURBAN CENTERS AND CARS. Gas-electric passenger motor cars and trailers of the Electric Short Line Railway at the Minneapolis passenger and freight station near the center of the city, shared with the Dan Patch Electric Lines

locomotives of the type illustrated are used for hauling passenger cars and are equipped with the General Electric Company's system and type 215-D 100 hp. motors, four motors to each of the electric locomotives and two to the motor passenger cars. Nineteen passenger trailer cars are employed on the system and are of the type illustrated on page 234, the latest cars furnished having a seating capac-

The Electric Short Line Railway, also known as the Luce Electric Lines, runs directly west from Minneapolis, a distance of 40¼ miles, touching the north end of Minnetonka Lake at Wayzata, a town of 1,500 population, and ending at Winsted, a town of 1,000 population. As stated above, the Minneapolis terminal of the Luce Electric Lines is shared with the Dan Patch Electric Lines and is

VIEWS ON THE ELECTRIC SHORT LINE



close to the heart of the business section of the city.

Outside of Minneapolis it is estimated that the population tributary to the lines is about 35,000. The line, which is on private right-of-way for the entire distance, including the section within Minneapolis, has 40 miles of single-track and 12 of double-track. The method of operation is the same as on the Dan Patch Lines, in that

Minneapolis and Stubbs Bay, a distance of $17\frac{3}{4}$ miles. At present the car mileage is 1,160 per day, and the number of passengers carried is estimated to give a yearly total of 480,000. It is also estimated that at the present rate 18,000 tons of freight matter per year are being carried and 21,900 pieces of express matter. The line is being extended 50 miles and the extensions proposed to be built



INTERURBAN CENTERS AND CARS. Pullman car on the Electric Short Line, hauled by gas-electric motor passenger car in limited service between Minneapolis and Winsted

the General Electric Company's system of gas-electric propulsion is employed, using motor passenger cars with trailers. Trains are operated at a maximum speed of 50 mph. and average one stop per mile. Out of a total number of 37 passenger cars available 29 are used in normal operation.

The time-table shows 35 flag and regular stops from Minneapolis to Winsted and the running time between these two points is 2 hours. There are three through trains each way daily, and five trains are operated additionally between

within the next year total 150 miles.

The gas-electric motor cars seat 93 passengers and measure 68 ft. over the vestibules and 72 ft. over the bumpers; width over side sheathing, 10 ft. 4 in.; centers of bolsters, 52 ft.; weight of carbody, 24,000 lbs.; total weight of car and trucks fully equipped, 50 tons.

The territory to the north of Minneapolis is served by the $15\frac{3}{4}$ -mile line of the Minneapolis, Anoka & Cuyuna Range Electric Railway Company, which runs along the east bank of the Missis-



INTERURBAN CENTERS AND CARS. The Minneapolis, Anoka and Cuyuna Range Railway is supplied with current from Coon Rapids power station of the Minneapolis General Electric Company

issippi River and parallels the lines of the Northern Pacific Railroad.

The population of Anoka is 4,500, and outside of Minneapolis the population tributary to the line is 15,000. Sixteen points are given in the time-table and, as the line has but recently been completed, the present schedule of five trains daily each way is being operated with steam locomotives. It is expected that the overhead construction will be completed before September 1st and trolley service will be immediately installed with 2-hour service during the week days and hourly on Sundays between the hours of 6 A. M. and midnight.

The cars enter the city over the lines of the Twin City Rapid Transit Company. Power will be furnished by the Minneapolis General Electric Company from its sub-station at Coon Rapids and will be transmitted at 15,000 volt-

age; the line operating voltage is 600.

At first two cars will be used in normal operation with a third available for extra service. A maximum speed of 30 mph. will be obtained by the type of trucks employed and the number of stops per mile will average 4. Although the cars are to be run singly, they are equipped with multiple-unit control and are operated on the Minneapolis type of trucks with 6-ft. wheel base.

Freight cars will be operated for the transportation of farm produce, coal, etc., and express cars will carry produce and miscellaneous material. Within the next year it is expected to extend the line to Cuyuna Range.

The St. Paul Southern Electric Railway extends south from St. Paul through Inver Grove to Hastings along the west side of the

(Continued on page 248)

FIFTY FRONT-ENTRANCE CENTER-EXIT CARS FOR CLEVELAND

BRILL 51-E1 TRUCKS

THE Cleveland Railway Company has received nearly half of an order for 50 cars from the G. C. Kuhlman Car Company, and is placing them in service on the cross-town lines where the transfer points are most congested. Certain of these lines intersect as many as 12 main trunk lines within a distance of less than 3 miles. In fact, the chief business of the cross-town lines consists of transferring passengers, and as a large number of passengers must be handled at most of these transfer points, it is highly important that the time consumed in loading and unloading be reduced to the minimum.

Experience has proved that cars with large platforms, heretofore used on these lines, are inadequate to meet the situation satisfactorily, and as all stops on cross-town lines are on the near side, the

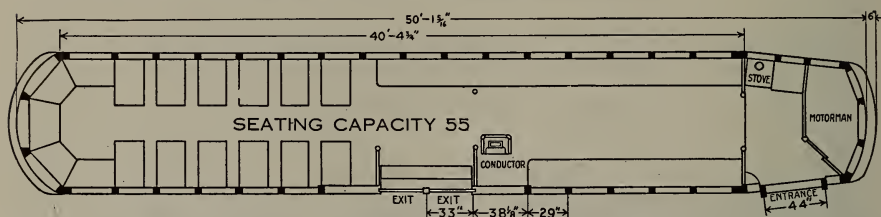
adoption of the front-end entrance for this service is entirely logical.

For service on the main trunk lines, which converge at the Public Square, the G. C. Kuhlman Car Company built two hundred center-entrance-exit cars for the Cleveland Railway during the last two years. These cars were designed for the Cleveland system of pay-as-you-enter and pay-as-you-leave fare collection, in which half of the car body, because of the pay-as-you-leave method, serves as a quick-loading space. The cars have been remarkably successful in reducing the time consumed in loading at the congested terminal in the Public Square, and the application of the same principle, with the addition of the nearside entrance, for the cross-town service, naturally follows.

The new cross-town cars may be termed the front-entrance, center-



CARS FOR CLEVELAND Front-entrance, center exit, prepayment and postpayment type for crosstown line service.



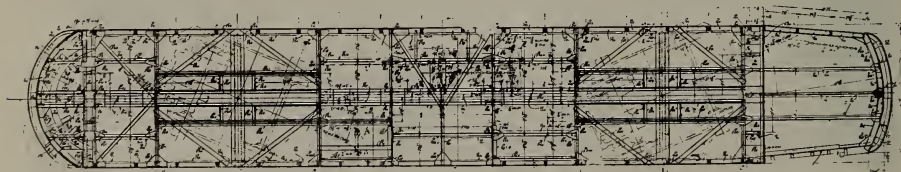
CARS FOR CLEVELAND. Height from track to underside of side sills, 2 ft. 1 1/2 in.; underside of side sills over trolley boards, 9 ft. 6 1/4 in.; floor to center of headlining, 8 ft.; track to step, 10 3/4 in.; step to platform, 12 in.; platform to floor, 9 3/4 in.; height of step at center exit, from rail to step, 12 3/4 in.; risers, 9 3/4 in.

exit, prepayment and postpayment type, and will doubtless meet the same popular favor and produce the desired results as the cars of the main trunk lines. Peter Witt, Street Railway Commissioner of Cleveland, is responsible for the general arrangement and fare-payment system, and Terrence Scullin, master mechanic for the Cleveland Railway Company, for the design and details of the cars.

As will be seen in the photographs and floor plan, the front half of the car has longitudinal seats, leaving a wide aisle for passengers to pass through to the rear half (which is equipped with transverse seats), and pass the conductor, who collects the fares of all persons passing between his position and a stanchion opposite. Those who remain in the longitudinal seat section do not pay their fares until leaving the car. Thus the front half serves as a loading area with a capacity sufficient to

receive the maximum number of passengers boarding at any transfer point, obviating delays incident to collecting fares on the platform. The double-door exit at the center of the side eliminates movement in opposite directions in the front end of the car, and by reducing the distance between the rear seats and the exit facilitates unloading. As the transverse seats in the rear half will naturally be occupied by passengers going further distances than those in the front half, the fact that there must be movement of passengers in the rear aisle in opposite directions is of little consequence.

In his cab at the front end of the car, the motorman has a full view of passengers entering and controls the simultaneously-operating folding door and step from his position. As the clear width of this door is 44 inches, two persons may enter at the same time. At the side exit there is a double sta-



CARS FOR CLEVELAND. Plate girder on devil-strip side extends to vestibule corner post. Box girder center member.

tionary step with stanchions on each side of the upper step and stanchions at the side and center of the lower step; between these stanchions the clear space is 2 ft., 9 in. The side doors are of the sliding type and are operated separately with a manual-pneumatic

lower sashes drop into covered pockets in the side walls.

In winter the cars are kept warm by a forced-air heater located on the front platform, and ventilation is secured by means of the Scullin exhaust ventilating system, which consists of a dummy monitor on



CARS FOR CLEVELAND. The rear half, back of the center stanchion is the prepayment section. Passengers in front half of car pay as they leave. See floor plan on opposite page.

device having small levers in front of the conductor's position. Hand rails without straps are provided for the front half of the car, while passengers standing in the rear aisle can steady themselves by hand rails on the seat backs. Large double-sash side windows have metal frames; the upper sashes are stationary, while the

the plain arch roof with louvers along the sides and circular ventilator openings in the car-body ceiling. The lighting arrangement, which is practically the same as used in the center-entrance cars furnished last year, was developed through exhaustive tests conducted by Mr. Scullin and consists of five 92-watt lamps along the center of

the ceiling for general illumination, and a sixth lamp connected with a selector switch for cutting into the circuit in case of the failure of any one of the five lamps regularly lighted. In addition there are five lamps of less power,

the center member. This girder is made up of a pair of channels with top and bottom plates and provides the strength necessary to compensate for the interrupted members at the center exit. On the devil-strip side, the construction is of the plate girder type, extending from bumper to bumper and reinforced at top with dropper bar section and riveted at the bottom to an angle sill. The sill extends straight through with the girder from bumper to bumper and bent inwardly at the front body corner post $6\frac{1}{2}$ inches to the vestibule corner post. The girder plate is deeper along the front platform, to cover and support the drop platform members on this side.

On the entrance side the girder construction is interrupted at the center exit and the framing is carried through by means of a depressed



CARS FOR CLEVELAND. The sliding doors of double center exit are operated separately by small levers in front of conductor's position.

one on the front platform, one over the fare box, one in the headlight and two in the destination sign. The seats are of Brill manufacture, those of the transverse type having stationary backs, and all seats are upholstered in twill-woven rattan.

The cars are built on a steel underframe, with a box-girder for

angle sill. The crossings are secured to the side members with extra large triangular gusset plates, and large gusset plates are used to strengthen the corner construction. As will be seen in the diagram of the bottom frame, the diagonals secure the construction

(Continued on page 253)

MOTOR PASSENGER CARS FOR HAVANA CENTRAL RAILROAD

BRILL 27-MCB2 TRUCKS

HAVANA, on the north coast and about 175 miles from the extreme western end of the Island of Cuba, is the foremost city of the West Indies, and its harbor is one of the largest and finest in the world. The two prin-

Guines, serving numerous intermediate suburban and rural points, the more important of which are Marianao, Punta Brava, Hoyo Colorado, Cotorro, San Jose de las Lajas and "Providencia Sugar Mill."



CARS FOR HAVANA CENTRAL. Cabs for motorman are at right hand corners and provided with folding seats for passengers, the doors being arranged to enclose control apparatus.

cipal agricultural staples of the island are sugar and tobacco, a great part of which is exported through the port of Havana. It also produces in considerable quantities fruits, vegetables, timber and metals, mainly iron, manganese and copper ore, and is adapted to coffee and cotton raising.

The Havana Central Railroad operates both steam and electric trains over its lines, which comprise 76½ miles of track and extend southwest from Havana to Guanajay, about 25 miles distant, and southeast through Regla and Guanabocoa about 30 miles to

The equipment of the road includes electric and steam locomotives, freight cars and passenger and baggage cars. Recently this equipment has been supplemented by six new motor cars built at the plant of the Wason Manufacturing Company.

These cars are for double-end operation and conform to the type adopted as standard by this line. The cabs for the motorman at the right-hand corners of the car are provided with folding seats which may be occupied by passengers when the cabs are not in use, the control apparatus being enclosed.

The principal dimensions of the cars are as follows: Length of body over corner posts, 47 ft.; length over platforms, 54 ft. 4 in.; width over sills, 9 ft. 2 in.; height from floor to headlining, 8 ft. 3 in.; track to platform, 19 $\frac{3}{4}$ in. The framing is long-leaf yellow pine

each post and an overhang truss rod extending along the belt rail and dropped at the ends to a point underneath the corner posts, where it is anchored by a casting bolted to bottom of side sill. The outside sheathing is red mahogany.

There are 17 double-sash win-



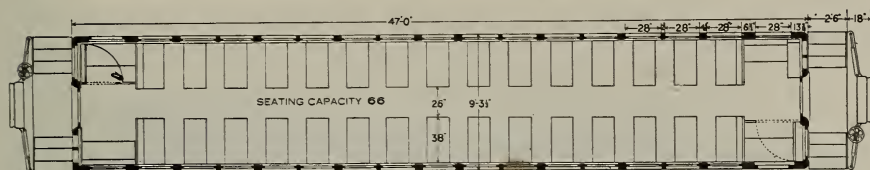
CARS FOR HAVANA CENTRAL. The upper window sashes are stationary and the lower arranged to raise their full height. Longitudinal corner seats.

throughout. The understructure consists of side sills and four center sills tied together by crossings tenoned into the side sills and reinforced by transverse tie rods spaced about 4 ft. 8 in. apart, and two under truss rods.

The sides are made up of alternate double and single posts, top plate, belt rail, truss plank and diagonals, reinforced by tie rods at

dows on each side furnished with red mahogany slat blinds; the lower sash is arranged to raise its full height, while the upper one is stationary. The roof is of the plain arch type and is provided with 16 ventilators, each having a sheet iron ceiling grill.

The interior woodwork is red mahogany and the ceiling is painted a light green. There are



CARS FOR HAVANA CENTRAL. Height from track to underside of side sills, 3 ft. 6½ in.; underside of side sills over trolley boards, 9 ft. 4½ in.; floor to center of headlining, 8 ft. 8½ in.; track to step, 10 in.; risers, 9¾ in.; platform to floor, 1 in. Wheel base Brill 27-MCB2 Truck, 6 ft. 6 in.; diameter of wheels, 33 in. Weight of car, including electrical and air equipment, 35,717 lb.; pair of trucks, 20,300 lb.; motors, 14,000 lb.; total weight, 70,017 lb.

30 transverse and four longitudinal seats, the former being upholstered with rattan and are reversible. Continuous bronze parcel racks extend the full length of car on each side. The seating capacity is adequate for 66 passengers.

These cars are designed for operation in trains or singly; they are fitted with M. C. B. couplers and are mounted on Brill 27-MCB2 trucks with a wheel base of 6 ft. 6 in. and 33-in. wheels, each truck being equipped with a pilot.

ONE-MAN CAR FOR MENOMINEE & MARINETTE LINES

BRILL RADIAX TRUCK

THE Menominee & Marinette Light & Traction Company, of Menominee, Michigan, has recently put in operation an interesting type of single-truck one-man car, built at the plant of the American Car Company.

Menominee, a thriving industrial city of 11,000 inhabitants, is about 155 miles due north of Milwaukee, at the southernmost point of the northern peninsula of Michigan, and at the mouth of the Menominee River, where it flows into Green Bay, an arm of Lake Michigan.

Lumber is one of the principal products of this region, and wood-working and papermaking occupy important places in its industrial activity; the manufacture of electrical appliances, pumps, pianos, shoes and flour also contribute

much to its commercial importance.

The Menominee & Marinette Light & Traction Company's line comprises 19.4 miles of track, and extends from City Park in Menominee south across the Menominee River to Marinette, Wisconsin, where its terminal point is Lakeside Park, a popular pleasure summer resort owned by the company. A total population of about 30,000, including Marinette's 15,000, is served by a normal operation of 17 cars, which is increased during the rush hours to 21 motor and 24 trail cars, all of which are single-truck cars somewhat similar in design, though quite different in construction, from the car recently purchased from the American Car Company.

No severe grades are encoun-



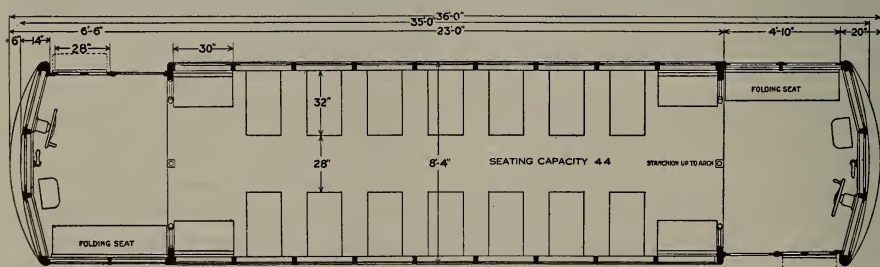
CAR FOR MENOMINEE AND MARINETTE. Long platforms afford greater seating and standing space. The car is mounted on Brill Radiax E1 Truck with 11-ft. wheel base.

tered on the road, the maximum grade being one of 3 per cent. in 200 ft., but frequent curves occur, the shortest of which has a 42-ft. radius. At each terminal point the line ends in a loop upon which the through-routed cars are turned.

The new car has a seating capacity of 44. It is 35 ft. long over the platforms, 23 ft. over the corner posts, and is mounted on a Brill Radiax E-1 truck, which has a wheel base of 11 ft. The underframe is of steel construction to the window sills and is made up

entirely of structural shapes and plates.

The side girders are formed of 28 by 5/32-in. plates, reinforced at the top by 2 by 1½-in. angles, and at the bottom by 5 by 3½ by ¾-in. angles. The plates are stiffened at each side post by means of 1½ by 1½ by 3/16-in. angles, which serve also as post supports. The end sills are 8-in. channels with oak filler. The crossings are 4-in. channels; and the wheel pieces are 4 by 3 by 5/16-in. angles. The frame is braced diagonally by means of 2½

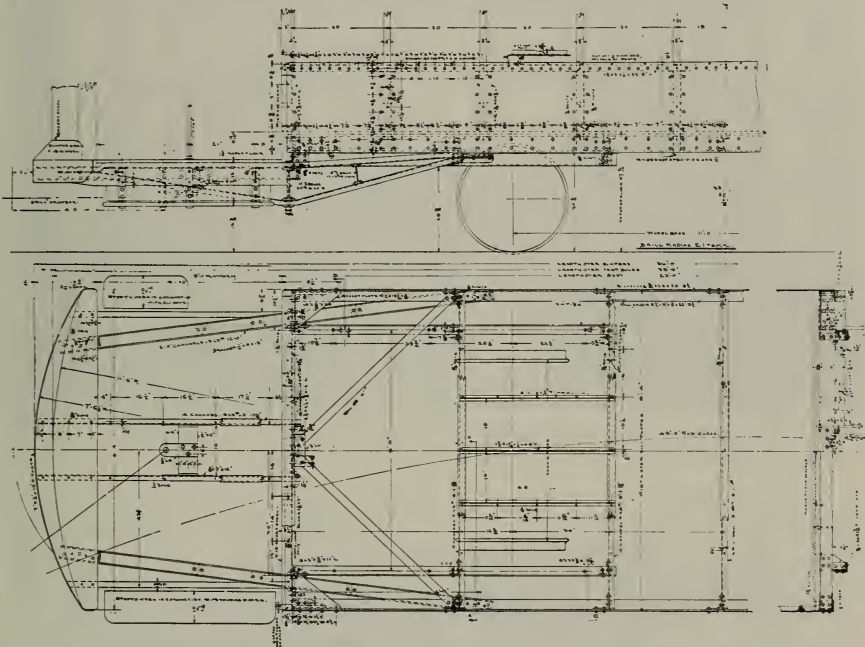


CAR FOR MENOMINEE AND MARINETTE. Height from track to underside of side sills, 2 ft. 6¼ in.; underside of side sills over trolley boards, 9 ft. 2 in.; floor to center of headlining, 8 ft. 3½ in.; track to step, 15½ in.; step to platform, 13 in.; platform to floor, 8½ in. Wheel base Brill Radiax E1 Truck, 11 ft.; diameter of wheels, 33 in.

by $\frac{3}{8}$ -in. iron bars, extending from the side sills to the center of end sills.

The outer platform knees are built-up trusses, the top and bottom members of which are 4-in. $5\frac{1}{4}$ -lb. channels with I-beam posts between. The center knees are single 4-in. $5\frac{1}{4}$ -lb. channels with oak

with one single and two double-sash windows arranged to drop into pockets, while those in the side opposite to the entrance door are the same as in the body. At the entrance side of platforms a two-leaf folding door, paneled above and below with plate glass, and which operates in conjunction with



CAR FOR MENOMINEE AND MARINETTE. All-steel underframe with plate girder side construction. Wooden corner and side posts.

fillers. The body framing is of ash, with 3-in. corner posts and 2-in. side posts. The Brill plain arch roof is fitted with six Brill Exhaust ventilators. The windows are double-sash type with stationary upper sashes framed in one continuous piece from end to end, the lower sashes raising to the height of the lower edge of the upper sashes.

The vestibule ends are provided

a folding step, occupies half the space between the vestibule corner post and the body corner post, the balance of the space being filled by a panel, glazed above to match the side windows.

The interior arrangement was designed to facilitate the free movement through the aisle of entering and departing passengers; the aisle measures 28 in. in width, and the Brill Winner transverse



CAR FOR MENOMINEE AND MARINETTE. Three pipe stanchions are substituted for bulkhead. Upper sashes stationary; lower sashes raise full height.

slat seats, of which there are seven on each side, are 32 in. wide. In addition to the transverse seats, there is one longitudinal seat in

each corner of the body, and one in each vestibule, the latter being arranged to fold up against side of car when not in use.

INTERURBAN CENTERS AND INTERURBAN CARS

(Continued from page 238)

Mississippi River, a distance of 17½ miles. As the line connects with the Twin City Rapid Transit System, over which passengers may be transported directly into Minneapolis, it may, therefore, be included among the interurban systems radiating from this center.

This line is also of comparatively recent construction and 30

miles additional is now in the course of building. It is expected that the line will eventually be 125 miles long and will reach Zumbrota, Pine Island, Rochester, Red Wing and Lake City. The system purchases its power at present from the River Falls Power Company at 33,000 volts and converts it to 600 volts.

OPEN CARS FOR VALENCIA, VENEZUELA

BRILL 21-E TRUCKS

VALENCIA, the capital of Carabobo in the district of Valencia, is situated 1,625 feet above sea level, in a mountainous country in the northern part of Venezuela. It is connected by the Puerto Cabello & Valencia Railroad, with Puerto Cabello, on the Caribbean Sea coast, 24 miles directly north; and by the Great Venezuelan Lines with Caracas, the capital of Venezuela, 111 miles east by north.

Valencia has a population of 27,538. It was founded in the 16th century, and was the scene of the battle in which Venezuela gained its independence. It is adjacent to Lake Valencia and has a mild

and healthful climate. Several medicinal springs are located nearby along the route to Puerto Cabello and are much frequented by the people.

Agriculture is the principal industry of the district, the chief products being coffee, cocoa, sugar and cotton. Cattle raising is also practiced to some extent, and the hides exported.

The Tranvias Electricos de Valencia, or Valencia Tramways Company, whose road is now building, has purchased its initial equipment from The J. G. Brill Company. This consists of four single-truck open cars of an interesting type. They are constructed



CARS FOR VALENCIA. Length of body, 15 ft. 13 $\frac{1}{2}$ in.; over platforms, 24 ft.; centers of side posts, 2 ft. 6 in.; width over sills, 4 ft. 9 $\frac{3}{4}$ in.; width over posts, 5 ft. 8 in.; extreme width, 6 ft. 0 $\frac{1}{2}$ in.; height from track to underside of side sills, 2 ft. 3 in.; floor to ceiling, 8 ft. 0 $\frac{1}{2}$ in.; track to step, 19 $\frac{3}{4}$ in.; step to floor, 13 $\frac{3}{4}$ in. Wheel base Brill 21-E Truck, 5 ft. 6 in.; diameter of wheels, 33 in. Weight of body, less electrical equipment, 6,500 lb. Weight of truck, less motors, 5,520 lb.

throughout of teakwood and, being for operation on narrow gauge tracks, are but 5 ft. 8 in. wide at the belt rail, and 4 ft. 9 $\frac{3}{4}$ in. at the sills.

The seating arrangement, which accommodates 32 passengers, 4 to a seat, consists of 4 stationary and 4 reversible transverse benches with slat seats and backs, the reversible benches being braced underneath by a flat iron bar, 1 $\frac{1}{2}$ by $\frac{3}{8}$ in., extending from just inside of the round-corner seat-end panels, where it is bolted to the floor, to bottom of seat at center, where it is fastened with screws.

The running boards are oak, banded with half-round iron, and supported by 2 $\frac{1}{4}$ by $\frac{5}{8}$ -in. steel brackets. The trucks are the Brill 21-E type with 5-ft. 6-in. wheel base; 33-in. iron wheels with 2 $\frac{1}{2}$ -in. steel tires; each end of truck is provided with oak slat life guards.

The bottomframe is made up of 3 by 6 13/16-in. side sills, plated on the inside with 6 by $\frac{1}{2}$ -in. steel; 3 $\frac{1}{2}$ by 6-in. end sills tenoned into side sills which extend to crown piece; 4 by 6-in. center crossing tenoned into side sills, as are also the two intermediate crossings, one

of which is 3 by 6 in. and the other 3 $\frac{1}{2}$ by 6 in. Connections between cross members and side sill are all reinforced by steel knees bolted together.

The corner posts are 3 $\frac{3}{8}$ in. thick and the side posts 3 in. thick, bolted at the bottom to steel round-corner seat-end panels, which have a sweep of 5 $\frac{1}{8}$ in. and are fastened to the floor with steel angles. Each post is fitted with twin grab handles.

The bulkheads extend to and help support the roof, which is of the monitor deck type and rests on four 1 $\frac{1}{2}$ by $\frac{1}{4}$ -in. steel carlines, bent to shape of roof and bolted to top rails. Each bulkhead has three single-sash windows arranged to drop into pockets.

The dashers are No. 12 steel, 2 ft. 9 $\frac{1}{2}$ in. high and are fastened by dasher rail to stanchions extending from crown piece to under side of hood. The side curtains are kept straight by steel battons and are arranged to pull all the way to the floor. Illuminated destination indicators are fixed to the roof at both ends of the car. These are made of metal and rest on teakwood blocks.

COMBINATION PASSENGER AND BAGGAGE CARS FOR "THE HEART OF MARYLAND"

BRILL SEMI-CONVERTIBLE TYPE

INCLUDED in an order of cars recently built by The J. G. Brill Company for the Hagerstown and Frederick Railway Com-

pany, of Frederick, Maryland, were two semi-convertible combination passenger and baggage cars for interurban service between the two

towns from which the road takes its name.

The run from the company's terminal building at Carroll and Patrick Streets, Frederick, to the B. & O. R. R. station at Hagerstown, a distance of twenty-nine miles through this beautiful and most fertile section in "the heart of Maryland," is made in one hour and fifty minutes, making an average of about twenty-five stops. The territory served by the road em-

Two mountain ranges, the Blue Ridge and Catoctin, are crossed in the run from Frederick to Hagerstown and a number of severe grades encountered, the longest being about one mile and varying from 6 to 7 per cent. Two summer resorts are reached by the line, Braddock Heights Park, on top of Catoctin Mountain, five miles west of Frederick, from which a view of four states may be had, and Pen-Mar Park, in the Blue



CARS FOR HAGERSTOWN AND FREDERICK RAILWAY. The car was on shop trucks when photographed. It was subsequently mounted on Brill 27-G1 Trucks.

braces the second richest agricultural district in the United States, and is the home of numerous and diversified industries, the most important of which are canning, iron, steel and wood manufactories and flour mills.

Outside of the terminal points, the population tributary to the line is about 35,000, embracing the towns of Williamsport, Thurmont, Boonsboro, Jefferson and Braddock Heights, Md., and Shady Grove, Penna. The company also has light and power lines extending to Jefferson, Walkersville and Lewistown, Md.

Ridge, northeast from Hagerstown, on the line to Shady Grove.

The two combination passenger and baggage cars are 46 ft. 5 in. long, including front and back platforms, and have a seating capacity of 40 and a baggage compartment 9 ft. 6 in. deep.

The underframe is composed of double side sills of long-leaf yellow pine, 2¼ in. x 6 in. and 4 in. x 8¾ in., plated between with a ⅜ in. x 15-in. steel plate and a single truss rod of refined iron under each sill; two center stringers of 3½ in. x 4¼-in. yellow pine, which extend beyond end sills and serve as

center knees of platforms, are reinforced under the baggage compartment by 3 x 4 x 1½-in. angles; end sills of 5¼ x 6⅞-in. oak; crossings of 3½ x 4¼-in. oak. The outer knees of the platform are 3 x 4 x 1½-in. angle with yellow pine fillers to which the flooring is attached. Ash corner posts, 3⅝ in., and side posts, 3¼ in., are the main members of the upperstructure, and are sheathed on the outside with vertical poplar boards. Brill two-leaf automatic folding doors enclose the door openings on both sides of front and back platforms. The door opening leading from the front platform into the

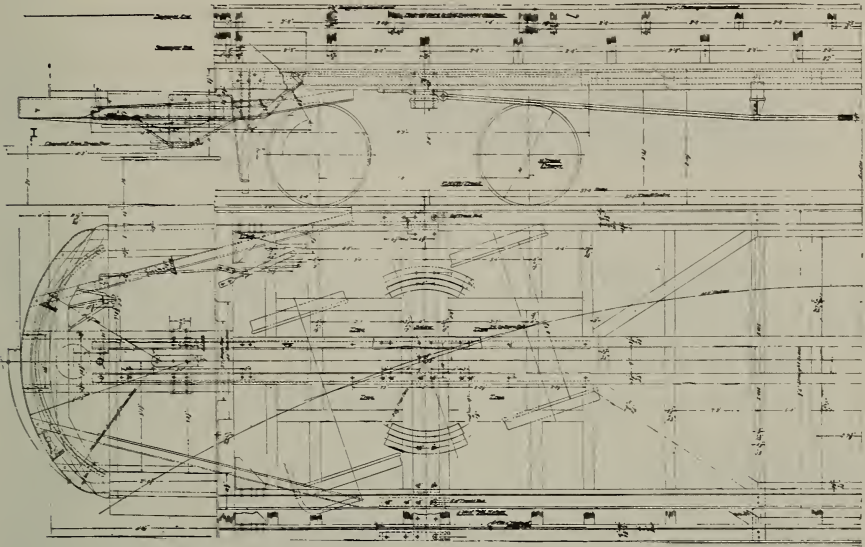
baggage compartment is equipped with double sliding doors of the mutually-operating type, and a single door between the baggage and passenger compartments of the same type; the side doors of the baggage compartment are the usual single sliding type.

The side windows have double sash, the lower hinged to the upper one, and are arranged to raise into the roof. The sashes in the vestibules are of the single type and drop into pockets.

The interior of the passenger compartment is finished in cherry, and the seats, which are of the Brill "Winner" type, are uphol-



CARS FOR HAGERSTOWN AND FREDERICK RAILWAY. The windows are of the Brill tandem-sash semi-convertible type with roof window pockets entirely enclosing the sashes when raised



CARS FOR HAGERSTOWN AND MARYLAND. Length of body, 37 ft. 0 in.; platforms, 4 ft. 8½ in.; baggage compartment, 9 ft. 2 in.; centers of side posts, 2 ft. 8 in.; width over sides, 8 ft. 6 in.; width of aisle, 22 in.; height from track to underside of side sills, 3 ft. 3¼ in.; track to step, 16 in.; risers, 11 in.; platform to floor, 8½ in.

stered with twill-woven rattan. The interior of the baggage compartment is painted a dark gray, and has two longitudinal seats of wood slats which fold against the

side of car when not in use. Next to the vestibule farthest from the baggage compartment is a toilet room in one corner. The cars are mounted on Brill 27-G-1 trucks.

FRONT-ENTRANCE CENTER-EXIT CARS FOR CLEVELAND

(Continued from page 242)

substantially against any tendency to cornerwise deflection. The bolsters are built up of two pressed steel plate channels forming the web members, to which top and bottom plates are riveted.

The corner posts are formed of angles which are continuous across the car and finished over with wood. The side posts are of ash and are connected to the side construction by means of light angles riveted to the side plates. Pressed

steel carlines support the plain-arch roof and have wooden strips bolted at one side which furnish the means for attaching the roof boards ceilings.

All of these cars, like those in the main trunk line service, built last year, are mounted on Brill 51-E trucks, which have a wheel-base of 4 ft. 10 in., 26-in. wheels, 3¼ by 8-in. journals, and are equipped with four 40 hp., 550-volt commutating pole motors.

SUGGESTIVE SUBJECTS

NOTE.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

DISSATISFACTION which moves a man to efforts to better himself is a good thing and is the only kind of dissatisfaction that a man should tolerate in himself.

Any man of average mental attainments and health can put himself where he wants to be if he makes up his mind to do so and applies the proper mental force. And there is always a place open for the fit man.

Study your work and improve the methods by which it is done. Study the men above you and their methods. Develop your mind, take care of your health, be honest with all men and particularly with yourself, and you will become one of those who have the habit of making good.

The man who does his work as it should be done and studies means by which it can be done better and thus proves his worth to the company as an investment, is the man who gets ahead. The man who does not do these things remains where he is or else is dropped to make room for a better man. Any right-minded man can rise in this business. It depends entirely upon himself.

The normal man who sets an objective point for himself and then works steadily toward that point will arrive with a calm, well-balanced mind and with sufficient strength in reserve to carry him through the remainder of his career.

Most men have to work, but comparatively few really like to work; that is, not all men like to do the work they are called upon to do. The other man's work seems so much more interesting. The result is, that a good many men do not give a full day's work for a day's pay. It would be difficult, if not impossible, to get these men to admit that they are dishonest, but that is what it amounts to.

SUGGESTION FOR A NEWSPAPER ADVERTISEMENT

EVERY street railway has a set of rules for the guidance of its employes in the performance of their duties. Most of these rules were fixed for the purpose of insuring the traveling public against accident and inconvenience.

There are also a few rules for the guidance of the public while they are passengers on the street cars. All of these are for the express purpose of protecting them against accident and inconvenience, and to facilitate their prompt arrival at the point for which they start.

The management of the lines requires strict adherence to the rules from their employes. The conductor or motorman must not break any of them under any circumstances. Any infraction of the rules is likely to be followed by accident or trouble of some sort.

Now, wouldn't it be a mighty good idea for everybody to set the employes and each other a good example by promptly and cheerfully observing all the rules and regulations? Remember that these very rules are *for your safety and convenience*; they were *not* made up to restrict your liberty nor limit your privileges. If everybody helps to have them enforced by observing them himself, everybody will be safer and more apt to reach his destination on time. *Are you doing your part?*

CALLING STREETS

ONE of our older conductors says that during the first months on the platform he discovered that calling streets clearly, and so that all passengers could hear, saved him as well as the passengers a lot of trouble. He says that if a conductor faces the far end of the car and lifts his head up a bit, his voice will carry easily through the clear space between the roof and the passengers' heads and will be heard at the farthest seat. He says that he never shouts, but just raises his voice a trifle and speaks the words distinctly and in a steady, even tone. He believes that a conductor who bawls out the name of a street in a sing-song fashion shows about as much intelligence as the one who says something in an undertone as his car approaches a crossing.

COMPANY'S RULES

NOW and then a man is heard to criticise, and occasionally to condemn, a rule which has been fixed by the management.

These rules are sometimes made to fit conditions about which you can have no definite knowledge, and their importance may not be

apparent to you; but it is always best to assume, that any rule fixed by the company is a good rule, and many of them are made for your benefit, though you may not realize that this is so.

Obey all rules without question, and enforce those that apply to the traveling public firmly but courteously. If you have any ideas for new rules whereby the safety of the passengers and the crews may be increased or the service of the road improved, tell the management about them in a letter. Suggestions of this kind are always appreciated.

But do not criticise nor kick against the rules as they stand. There is a good and sufficient reason for each and every one of them and they must be adhered to.

SINGLE-TRUCK CARS

IT is many years since the single-truck car was the subject of the general attention it is receiving at present. From parts of the railway field where nothing but double-truck equipment has been employed for a decade or more, from places where double-truck cars constituted the initial equipment and single-truck cars have never been added, come very definite evidence of deep interest in the possibilities for greater efficiency and economy of shorter and lighter cars.

Apparently the time has arrived for the single-truck car to show what it can do toward increasing the riding habit by more frequent schedules and at the same time hold down operating costs. Practical operators of both large and small city railway systems in many quarters believe that the modern single-truck car in one or other of its variations as a supplement to their present equipment of double-truck cars, is the logical solution of the problem of how to provide better facilities and thereby induce the public to "take the trolley" oftener for business and pleasure.

In addition to the variety of types of single-truck cars shown in recent issues of BRILL MAGAZINE, other designs have been furnished which have features applying to more or less local conditions, and some are of the lightest weight for their capacity consistent with strength and durability. For these light-weight cars a truck has been designed and has been in service for a sufficient period under different operating conditions to establish it among the standard types of Brill trucks—the 74-Truck, shown in the advertisement on the inside of the front cover of this issue.

The Brill 21-E Truck for larger car bodies, and the "Radiax" Truck for bodies beyond 21 ft. over the corner posts and requiring a long wheel base, these with the 74-Truck furnish the means for operating four-wheel cars of all lengths with the same smooth riding qualities which double-truck cars possess and to which the public is accustomed.

Vol. 8 (1914), pages 22, 90, 142, 170, 179, 183, 214, 242, 245, 284, 315, 341. Vol. 9 (1915), pages 15, 89, 120, 187. Bulletin 216, recently published, gives other information on the subject of single-truck cars.



THE J.G. BRILL COMPANY

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CABLE ADDRESS: "BRILL," PHILADELPHIA

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G.C. KUHLMAN CAR CO., CLEVELAND, OHIO

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WASON MANFG. CO., SPRINGFIELD, MASS.

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AGENCIES

PACIFIC COAST—Pierson, Roeding & Co., 118
New Montgomery Street, San Francisco; Los Angeles,
Seattle

AUSTRALASIA—Noyes Brothers, Melbourne, Sid-
ney, Dunedin, Brisbane, Perth

BELGIUM AND HOLLAND—C. Dubbelman, 48
Rue de Luxembourg, Brussels

ARGENTINE AND URUGUAY—C. S. Clarke &
Co., Calle Bartolome Mitre 478, Buenos Aires

NATAL, TRANSVAAL AND ORANGE RIVER
COLONY—Thomas Barlow & Sons, Durban, Natal

CHINA—Shewan, Tomes & Co., Hong Kong, Can-
ton, Shanghai

ITALY—Giovanni Checchetti, Piazza Sicilia 1, Milan



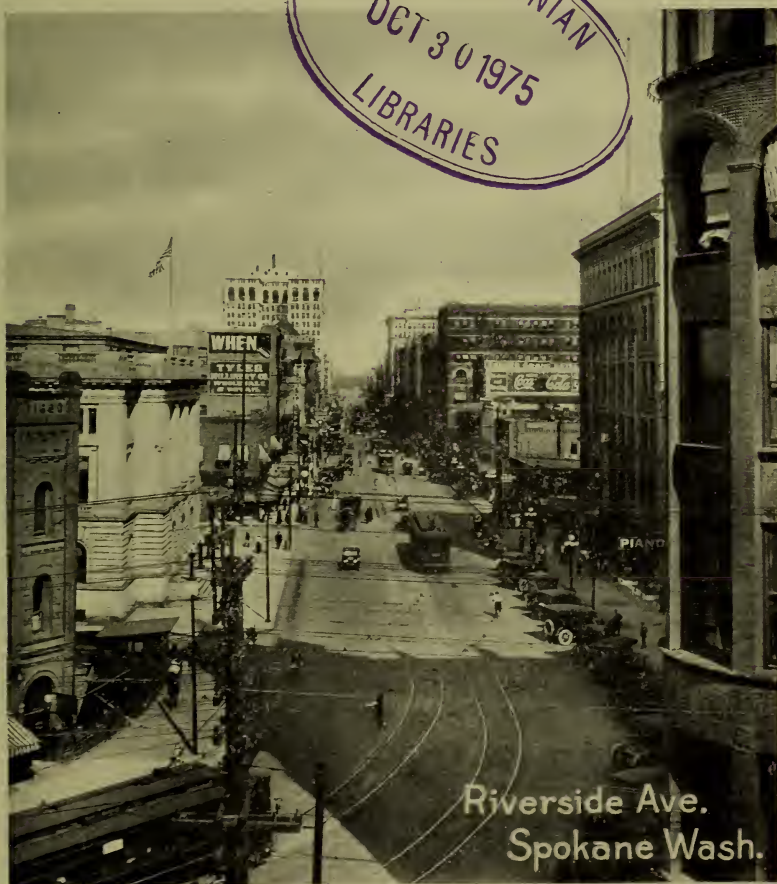
BRILL BEVEL-GEAR-DRIVE SNOW SWEEPER

THE Brill Bevel-Gear-Drive for snow sweepers has been developed during the last two years and thoroughly tested to produce a machine equal to the severe service conditions under which a snow sweeper must qualify in the northern cities of the United States. Sprocket wheels and chains of the former types of sweepers present such a large number of wearing surfaces that replacement is necessarily frequent. This is overcome by the bevel-gear-drive, in which the operating connection between the motor and the brooms is subject to conditions similar to motor gearing, and the gears are entirely enclosed and run in lubricant. The motor for propelling the brooms is located at the center, with a shaft extending horizontally at either side ending in a bevel gear directly over the center of the broom shaft at either end. A jack shaft with bevel gears at top and bottom transmits the power from the horizontal shafts and is arranged to permit raising and lowering of the brooms.

THE J. G. BRILL COMPANY, PHILADELPHIA

BRILL MAGAZINE

SPokane
OCT 30 1975
LIBRARIES



Riverside Ave.
Spokane Wash.



LONG LINKS OF THE "RADIAX"

THE purpose of the long links used in the Brill "Radiax" Truck is to allow radial motion of the truck in taking curves and at the same time to exert a powerful force tending to overcome the motion and return the truck to its normal position. The very length of the links makes clear how considerable radial motion is made possible. The function of the links in drawing the body back to its normal position when leaving a curve or in passing over irregularities of the track is made positive action by the two pins at the lower end of the links. These pins engage in grooves, and when the link is pulled at the slightest angle from its upright position, one or the other of the pins comes out of its groove, and immediately a powerful tendency to return the link to its normal position is set up. If the car stops on a curve, the axles will return toward but never quite resume their normal position. As the car is started again, the angle of radiation is of course increased. Solid-forged side frames are one of the important features of the Brill "Radiax."



Wm. A. Bauscroff

PRESIDENT, BOSTON ELEVATED RAILWAY COMPANY

“The public must be accommodated, labor must be well paid, capital must receive its suitable return, and the function of providing for income, having been taken away from those who formerly had it, must be exercised by those who now have it, and if costs are higher a larger income must be provided for.

“Time was when public service business was conducted as is private business. People invested, took the risks, fixed the rates, and took the profits, if there were any. The public came to find fault with the service. Labor wanted a larger reward. Government took control. But when government takes control of business, government cannot avoid its responsibility any more than can private individuals, including provision for a larger income if needed to support new conditions.

“Government, to use the language of the President of the United States, must play the whole game, and must play it according to the rules. It cannot leave out any part. It must provide for capital, both for new and for old, as well as for service and for labor. It must raise rates, if necessary, just as managers did before their power to do so was taken away.”

—From speech on “Income Responsibility,” delivered by Maj.-Gen. W. A. Bancroft at annual banquet of the New England Street Railway Club, March 25, 1915.

SEPTEMBER 15, 1915

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MAJOR-GENERAL THE HON. WILLIAM AMOS BANCROFT

MAJOR-GENERAL THE HON. WILLIAM AMOS BANCROFT was born at Groton, Massachusetts, April 26, 1855. After attending the public schools he entered Lawrence Academy, and later continued his studies at Phillips Exeter Academy. Having finished his course at Phillips Exeter, he graduated at Harvard College (1878), and afterward studied at the Harvard Law School. While at Harvard he was captain and stroke of the winning 'varsity crews of 1877-'79. He followed the practice of law and held the positions of Councilman, Representative to the Legislature, President of the Board of Aldermen and Mayor of Cambridge. He served in the Spanish-American War, holding the rank of Brigadier-General of United States Volunteers. Having enlisted as a private in 1875, he was retired in 1901 with the rank of Major-General of the Massachusetts Volunteer Militia. General Bancroft entered the railway field January 31, 1885. Since then he has held the positions of Superintendent of the Cambridge Railroad, Roadmaster of the West End Railway, Vice-President of the Boston Elevated Railway Company and President of the latter company, the duties of which office he assumed September 13, 1899. Being an alumnus of Phillips Exeter Academy and Harvard College, he takes a great interest in both institutions of learning, and for twelve years was an overseer of Harvard and is a trustee of Phillips Exeter. He is also director or trustee of various other financial and educational institutions, and is at the head of several societies and clubs. He is a member of the Traffic Club of New England.

INTERURBAN CENTERS AND INTERURBAN CARS

SPOKANE

NESTLED down in the eastern part of the State of Washington between the high chain of the Rockies, which shuts off the chill winds of winter, and the lower passes of the Cascades on the west, and swept in winter by warm breezes from the Japan current and in summer by cool and refreshing winds blowing up the Columbia River from the Pacific, there is a land known as the Inland Empire. There are 150,000 square miles of this Inland Empire, and right in the center of that expanse there is located one of the most progressive cities in the United States—Spokane, a city which has grown in the last thirty years from a population of a mere handful to a point where its census returns show a total of 125,000 people.

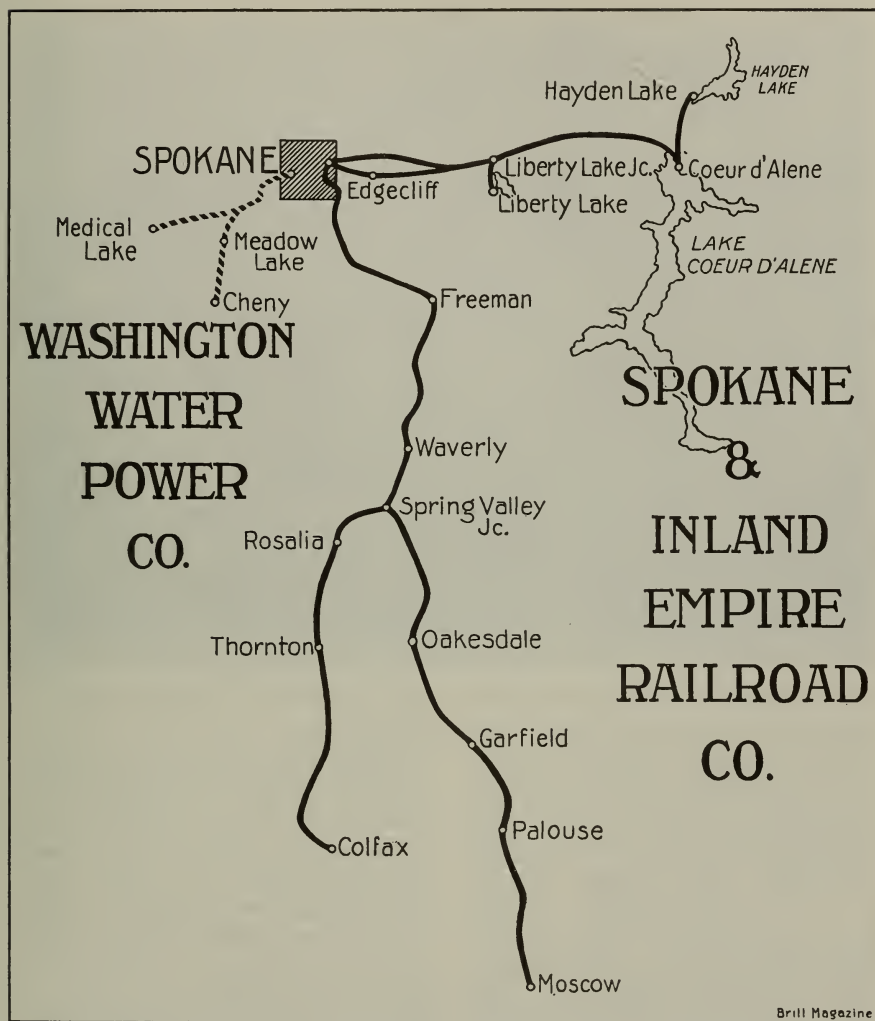
Bounded by the Rockies on the east, the Cascades on the west, and extending from British Columbia to Northern Oregon, the vast Inland Empire spreads a panorama of human activities. Cutting through this wonderful district, bisecting the city of Spokane and aiding materially in the growth of the city and the surrounding country, there flows the Spokane River, one of the most famous power streams of the Northwest, whose falls and rushing current are almost unlimited in power potentiality. Within 50 miles from the city of Spokane this river has been con-

trolled to supply 400,000 horsepower of electrical energy.

A modern, substantial, progressive city is Spokane. It is clustered about the Spokane Falls from which it gets its name and where only 30 years ago few people lived. Its remarkable growth may well be seen from the census reports of its population. It was first settled in 1872. In 1900 the city had grown to a total of 36,000. In 1910 the total showed 104,402, while the present estimated total is well above 125,000. Not only is Spokane rushing forward steadily and surely, expanding along stable lines, but its surrounding territory, the Inland Empire towns and villages, have made rapid strides to keep pace with the city.

Located in the dry, bracing atmosphere of the highlands, Spokane has a temperature record which indicates the splendid conditions which boom its agriculture. Its temperature record is perhaps a fair record for the whole country. The annual normal temperature is 48 degrees, with a low monthly normal of 27 degrees and a high monthly normal of 69 degrees.

The surrounding country is probably unsurpassed in variety and richness of resources. The mines of this section in 1914 netted profits in the form of dividends amounting to \$7,500,000. The district contains 250,000,000,000 feet



Brill Magazine

of timber, including the largest stand of white pine in the world, and the sawmills in 1914 manufactured lumber worth \$14,723,387. The annual wheat output exceeds 50,000,000 bushels. The fruit yield in 1914 was valued at \$8,000,000. The market of the farmer and stock raiser is exceedingly good, because

of the fact that the people of this region consume more meats, butter, eggs, poultry and farm and garden products than they produce, the cities being more fully developed than are the farming regions. Generally speaking, the district is a land of deep, rich, black soils, varying in quality and body and in the



Panorama showing Spokane, greatest railway center in the Pacific West

conditions in which they are found and in the other soils and substances in which they are mixed.

The population of the whole district exceeds 800,000. In this calculation, 200 towns and cities are considered. The Palouse country to the south of Spokane and the Big Bend district to the west are famous grain belts. Livestock raising and dairying have met with splendid success. In the Spokane River valley fruit growing is followed extensively. The system of irrigation which is in operation gives assurance of good crops from all sorts of farming and this necessarily creates a bountiful supply of stuffs to be marketed, and therefore a demand for transportation. To the north there are the Arcadia, Kettle Falls and Pend Oreille Val-

leys, all full of orchards, gardens and dairies.

Spokane, naturally an unusual and interesting city because of the waterfall in its center, is situated in a region blessed with many mountain lakes, which are very beautiful and which draw to them tourists, vacationists, campers and in general create quite a need for good traffic facilities. To supply this need there are two large electric railway companies, the Spokane & Inland Empire Railroad Company and the Washington Water Power Company. The latter company not only supplies traffic facilities, but furnishes power for the mining of the country, energy for lumbering operations, and current for lighting purposes.

Spokane is the greatest railway



Five transcontinental railroads operate into the city on their own tracks

center in the Pacific West. Five transcontinental railroads operate into the city over their own tracks—the Northern Pacific, the Great Northern, the Chicago, Milwaukee & St. Paul, the Canadian Pacific and the Oregon-Washington or Union Pacific. Two others, the Burlington and the Northwestern, operate under traffic agreements. The stop-over privileges of these roads, coupled with the beautiful surrounding country, which acts as a lure for side-trips, bring to the electric roads operating interurban lines out of Spokane a very considerable amount of traffic.

The Spokane & Inland Empire Railroad Company is a consolidation of the Spokane Traction Company, Spokane Terminal Company, Spokane & Inland Railway Com-

pany and the Coeur d'Alene & Spokane Railway Company, Ltd. It operates three kinds of service—urban, suburban and interurban. Its lines connect Coeur d'Alene and Moscow, Idaho, and Colfax and Spokane, Washington.

The company owns parks at Hayden and Liberty Lakes; Ball Park, Spokane; Blackwell Park, at Coeur d'Alene, and reaches Manito Park, Corbin and Liberty Parks at Spokane. It feeds on a total tributary population of 179,000.

The line which connects Spokane with Coeur d'Alene is about 30 miles in length. It parallels two steam railroads for practically its entire length, following roughly the course of the Spokane River, which it crosses between Coeur and Curoe, a point about 18 or 20 miles



INTERURBAN CENTERS AND CARS. Terminal freight station at Spokane—Spokane & Inland Empire Railroad Company

out of Spokane. A branch located at a point just before the line crosses the Spokane runs a short distance due south to Liberty Lake, Spokane's "inland seashore," 2,000 ft. above sea level. The lake is 17 miles from Spokane, and frequent schedules on the "Inland" make it easy of access. The attractions of the place include its bathing beach, its facilities for holding picnics, dances and banquets and its natural beauty.

and lies almost entirely within the bounds of the Coeur d'Alene National Forest.

To the south of Spokane there extends a long interurban line, operated by the "Inland," which connects Spokane with Moscow, Idaho, and with Colfax, Washington. The line forks at Spring Valley Junction, about 35 miles to the south of Spokane, and the Moscow branch bears off to the left, not crossing the State line into Idaho, however, until just before it reaches Moscow. The Colfax branch turns off to the right and then very soon turns due south again. The Moscow branch takes in Garfield and Palouse. Both lines run through a rolling wheat belt and through many truck farms and a land which is cultivated with vegetable gar-



Spring Valley Junction—Spokane & Inland Empire

dens and fruit farms.

Of the interurban system, approximately 45 miles of line are operated at 600 volts dc., using motor generator sets and rotary converters for power conversion, and approximately 125 miles are operated at 6,600 volts single phase, 25-cycle, single catenary trolley construction.

Power for the single-phase system is supplied from the Nine-Mile-Bridge hydro-electric plant, which has a capacity of 12,000 kw. and is located about 10 miles below Spokane on the Spokane River. The single-phase system is supplied at 60,000 volts, 60-cycle, 3-phase, and this is converted at the frequency-changing station of the company to 25-cycle, single-phase, and transmitted over the lines of the road at 45,000 volts. At distances of approximately 10 miles there are sub-stations which reduce the potential to 6,600 volts, at which pressure it is fed into the trolley system.

The company operates 179.61 miles of single track, which is divided as follows: Interurban, 147.45; suburban, 8.35; and urban, 23.81. It operates 42.82 miles of double track, of which 19 miles are inter-



INTERURBAN CENTERS AND CARS. Typical interurban train of Spokane & Inland Empire, showing pantograph collector

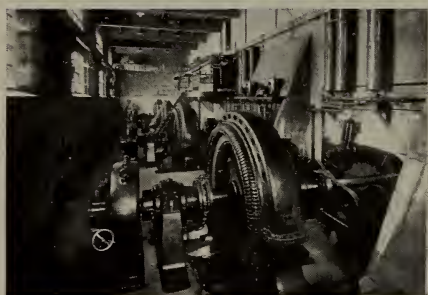
urban and 23.82 miles urban. Its repair shops are at Spokane and Coeur d'Alene.

The road connects with the following lines: Spokane—S. I. Ry., G. N. Ry., N. P. Ry., O. W. R. R. & N. Ry., C. M. & St. P. Ry. and S. P. & S. Ry.; Huetter—N. P. Ry.; Palouse—W. I. & M. Ry.; Moscow—N. P. and O. W. R. R. & N. Ry.; McGuires—C. M. & St. P. Ry.

The road has for its terminals



Palouse Station—Lines of Spokane & Inland Empire



NINE-MILE POWER PLANT—SPOKANE & INLAND EMPIRE RAILROAD

Interior Nine-Mile Plant

Interior Frequency Changing Station

Frequency Changing Station

cities whose population aggregates 150,000. The population of the cities and towns along the routes of the company totals 9,000, and the tributary population of each line is 20,000, making a total of 179,000.

In its interurban service the company now has in normal operation 25 cars and in the urban service it has 75 single-end type cars. It has a total of 45 available

ban and urban lines the fares are collected by cash registers.

The cars are run in trains of from two to five cars and are equipped with multiple-unit control. Power is taken from the single-phase line by pantograph and from the dc. line by trolley.

The cars used are of steel construction, and of the single-end operation type. They measure 58 ft. 9 in. over the vestibules and 58 ft.



INTERURBAN CENTERS AND CARS. Typical freight train of Spokane & Inland Empire. In this case the haul was a string of circus cars

passenger cars. In the interurban service the line is built on private right-of-way, and highways are not used. The maximum speed of the line is 45 miles per hour, and the average distance between stops is 1.3 miles.

The company, in addition to its passenger service, handles freight and express business of the same character as that handled by the steam roads. On the interurban passenger lines the method of fare collection is by conductor, the same as on steam lines. On the subur-

ban lines the fares are collected by cash registers. The cars are run in trains of from two to five cars and are equipped with multiple-unit control. Power is taken from the single-phase line by pantograph and from the dc. line by trolley. The cars used are of steel construction, and of the single-end operation type. They measure 58 ft. 9 in. over the vestibules and 58 ft. 11 in. over the bumpers. Their width over the side sheathing is 9 ft.; between centers of bolsters is 39 ft. 6 in. The cars have a seating capacity of 66 persons. They weigh 88,500 pounds equipped with motors, the trailers weighing but 58,600 pounds.

Each car is equipped with four motors, the dc. motors being of 90 hp., the ac. motors for the passenger service 100 hp. and the motors for the freight service 175 hp.

The traffic statistics of the company for the last year show that



INTERURBAN CENTERS AND CARS. Passenger terminal of Spokane & Inland Empire lines in Spokane

the number of passengers carried on the city lines was 10,962,254, and the total for the interurban 980,495. Statistics on car mileage showed a total of 102,855 non-revenue miles, with a total of 1,625,898 revenue miles and 1,447,120 revenue freight miles. The company hauled during the year 291,240 tons of freight.

The Washington Water Power Company, which owns the Arlington Heights Motor Railway, is one of the leading pioneer power development companies of the Northwest. Five huge hydro-electric power plants have been developed by the company. These developments are located on the Spokane River, three being in operation, one in course of construction, with an auxiliary in Spokane. The Spokane River, which has a maximum flow of 40,000 sec. ft., and a natural minimum flow of 1,500 sec.

ft., has its source in Lake Coeur d'Alene, which has an area of 45 square miles and is used as a storage reservoir for a depth of 6 ft., thus allowing a considerable increase of flow over natural minimum during the 120-day low-water period.

The current is transmitted from these power plants to cities and towns in the surrounding country. In addition to supplying this energy for light and power, the company operates a complete city street car system for Spokane and an interurban system connecting Spokane with Medical Lake, a distance of about 17 miles, and with Cheney, the seat of a State normal school, about an equal distance from the city. From 60 to 150 cars are in service all the time to meet the traffic demands, and it requires a total of 191 cars to handle the business of both city and inter-



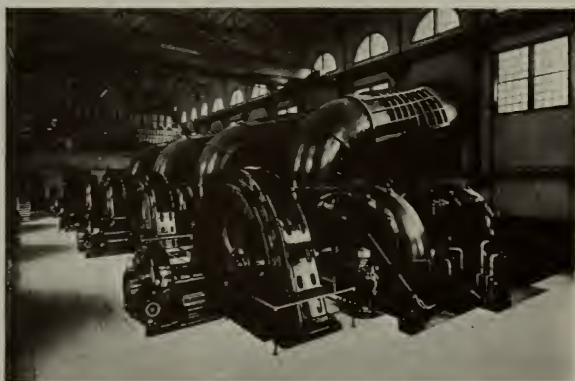
INTERURBAN CENTERS AND CARS. Main Falls Sub station of the Washington Water Power Company. This company has developed five great hydro-electric power plants on the Spokane River

urban lines. All cars are of standard Brill types, mounted on Brill 27-E 1½ and 27-E 1 trucks. There are 7 motor cars, 10 trailers, 10 box cars, 4 flat cars and 2 motor freight cars. For general use on both lines the company maintains 2 snow sweepers, a snow plow, 3 sprinkling tanks, 3 advertising cars and other necessary equipment.

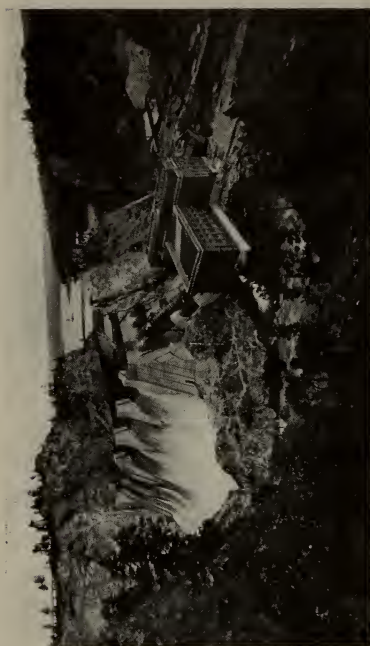
The interurban lines are gravel-ballasted and all the curves are guarded. The lines complete are equipped with the Willson automatic train arresters, making it impossible for trains to collide. Automatic blocks and train-stops make it impossible for accidents to occur, the trains being protected by automatic 2-position, upper-quadrant electric motor signals, actuated by 2,200-volt alternating current. It

is one of the few roads in the country on which automatic train-stops, operating in unison with all home signals, have been operated. The interurban line is 23.89 miles long and is single track. The location of sub-station for the interurban systems is at Jamieson and the terminal points at Medical Lake and Cheney.

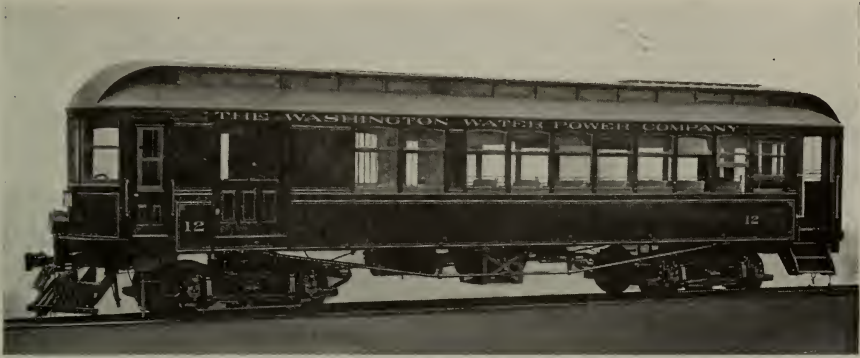
The length of the cars over vestibules is 47 ft. 6 in.; length over bumpers, 48 ft. 1½ in.; width over



INTERURBAN CENTERS AND CARS. Interior of Little Falls Power Plant of the Washington Water Power Company. The company supplies energy for lighting and power in addition to operating a railway



POWER PLANTS OF THE WASHINGTON WATER POWER COMPANY, LOCATED ON THE SPOKANE RIVER
 Past Falls Plant
 Bear trap and tainter gates, Past Falls Plant
 Long Lake Plant
 Little Falls Plant



INTERURBAN CENTERS AND CARS. Combination baggage and passenger car used on the lines of the Washington Water Power Company. The cars have on an average a seating capacity of 45 persons. They are operated in trains with multiple-unit control

side sheathing, 9 ft. 4 in.; seating capacity on an average, 45 passengers; centers of bolsters, 28 ft. 1 in.; total weight of cars and trucks, fully equipped, 32 tons. The cars are operated double and single in

trains with multiple-unit control, feeding down from a trolley. Each car is equipped with 4 motors, each motor being of 75 hp.

During the last year the company carried 266,897 passengers



INTERURBAN CENTERS AND CARS. The interior of the combination car shown above is shown in this illustration. The cars and trucks, fully equipped, weigh 32 tons



INTERURBAN CENTERS AND CARS. Station of the Washington Water Power Company at Medical Lake

with a car mileage of 339,130 miles. One of the principal items of freight and express is milk from Cheney. Also, during the last year the company hauled great quanti-

ties of gravel and sand from Spokane for use as building materials and in concrete work.

The country around Cheney is noted for the quality of its general



INTERURBAN CENTERS AND CARS. Terminal passenger station of the Washington Water Power Company in Spokane



INTERURBAN CENTERS AND CARS. Washington Water Power station at Cheney.
Both Cheney and Medical Lake are about 17 miles from Spokane

dairy products, and the company hauls a large amount of freight of that character into Spokane. In addition, the company does a general freight business that can be

handled with two freight trains. The type of the motor cars now in use by the company in handling these freight trains is shown in the cut on this page.



INTERURBAN CENTERS AND CARS. Baggage motor car with trailers, in use on freight trains of Washington Water Power Company

STEEL CARS FOR CHICAGO & MILWAUKEE

THE Brill Company recently completed an order of 15 steel cars for the Chicago & Milwaukee Electric Railroad Company. These cars were delivered to the company on their own wheels, being sent from the plant of The Brill Company to Highwood, Ill., by the following route: Philadelphia to Youngstown, Ohio, via Baltimore & Ohio Railroad; Youngstown to Chicago, via Erie Railroad; and Chicago to Highwood, via Chicago & Northwestern Railroad.

The company will use the new cars on its interurban lines between Chicago and Milwaukee, Wis. The company, which has its general offices in Chicago, controls the Waukegan, Fox Lake and Western Railway, a local line in Waukegan, and also operates the Chicago & Milwaukee Electric Railway, a local line in Milwaukee. The interurban system connects Chicago, Wilmette, Kenilworth, Winnetka, Glencoe, Highland Park, Highwood, Lake Forest, Lake Bluff, North Chicago, Waukegan, Zion

City, Libertyville and Area in Illinois; Kenosha, Racine and Milwaukee in Wisconsin. The company purchases its energy from the Milwaukee Electric Railway and Light Company and from the Public Service Company of Northern Illinois. This energy is transmitted at 16,500 and 33,000 volts and is fed into the trolley system at 600 volts.

The Milwaukee terminal of the company is located at Second Street and Grand Avenue, in the center of the business section. The Evanston terminal is located at Church Street, Evanston. The company



STEEL CARS FOR CHICAGO & MILWAUKEE. Front end of car, showing door of motorman's cab. The cab is partitioned up to the ceiling and is electrically heated. The wide outlook given the motorman is a good feature of the car



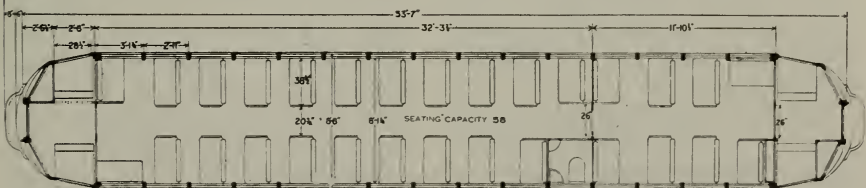
STEEL CARS FOR CHICAGO & MILWAUKEE. The car bodies are of the steel type with two compartments, a main passenger compartment and a smoking compartment

transfers to the Northwestern Elevated at Central Street, from which point it uses the tracks of that company. The running time between Evanston and Milwaukee, a distance of 70 miles, is 1 hour and 55 minutes. There are a total of 33 stops, with 18 passenger stops. South of North Chicago there is a 1-per-cent. grade, between North Chicago and Milwaukee there are 4 grades of 1 per cent., and in the city of Milwaukee there is another 1-per-cent. grade.

The line between Evanston and Waukegan has been in operation for 17 years and that from Evanston to Milwaukee 7 years. The company has used a total of 68 passenger cars. The old equipment

is shorter than the new cars furnished by The Brill Company and is of wood, whereas the new cars are of steel. The new cars will be used to haul trailers and will be operated singly and in multiple unit trains. With the receipt of the new cars the company intends to reduce materially the running time of its limited trains.

The company's lines, exclusive of Chicago, have a total tributary population of 600,000. The overhead trolley is used, except on the lines of the Northwestern Elevated, where a standard third rail shoe is employed for collection of current. The company operates 78 miles of double track and 12 miles of single track. The power which the com-



STEEL CARS FOR CHICAGO & MILWAUKEE. Height from rail to bottom of sill, 39½ in.; height from top of rail to top of trolley board, 12 ft. 5¾ in.; width over side sheathing, 8 ft. 8 in.; width over vestibule corner posts, 7 ft. 8½ in.; width of car inside, below windows, 8 ft. 2 in.



STEEL CARS FOR CHICAGO & MILWAUKEE. Main passenger compartment. This compartment has 11 windows. Interior finish is of best Honduras mahogany

pany purchases is transmitted from Milwaukee, Waukegan, Highwood and Evanston. There are 8 substations, located at the following distances from Evanston: Winnetka Station, 5.24 miles; Highwood, 13.51 miles; North Chicago, 21.60 miles; Kenosha, 35.35 miles; Racine, 47.95 miles; Carrolville, 61.07 miles; Milwaukee, 69.39 miles; and a station at Libertyville, 5.77 miles from Lake Bluff on a branch line.

The car bodies are of the steel frame type with 2 compartments, a main passenger compartment and a smoking compartment; saloon compartment; vestibules at each end with train doors and motor-

man's cabs arranged for double-end operation. The cars are mounted on Brill 27-M. C. B. Trucks, 2 trucks to each car. They are built for a maximum speed of 65 miles per hour, and have a wheelbase of 7 ft.

The cars are equipped with anti-climbers. Their length over these anti-climbers is 56 ft. 0 $\frac{3}{4}$ in. Other important dimensions of the cars follow: Length over buffer sills, 54 ft. 7 in.; length over vestibules, 53 ft. 7 in.; length over body corner posts, 44 ft. 2 $\frac{3}{4}$ in.; length of platform, 4 ft. 8 in.; distance between truck centers, 32 ft. 8 in.; width over side sheathing, 8 ft. 8 in.; width over vestibule corner



STEEL CARS FOR CHICAGO & MILWAUKEE. Smoking compartment of the car. This compartment has four window openings. Its glass door and bulkhead light are good features

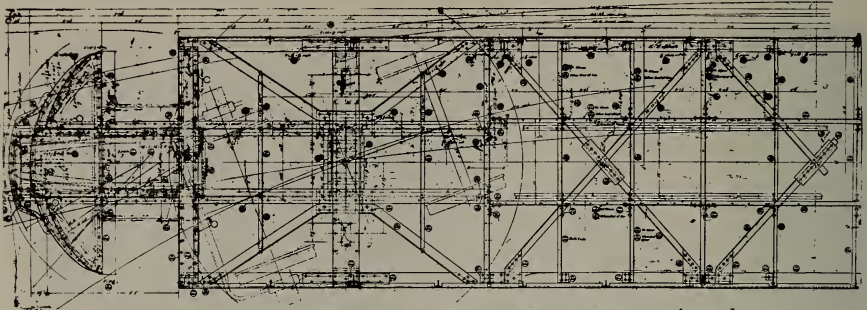
posts, 7 ft. 8½ in.; width of car inside, below windows, 8 ft. 2 in.; height from rail to bottom of sill, 39 15/16 in.; height from top of rail to top of trolley board, 12 ft. 5⅜ in.; distance from center to center of seats, 2 ft. 11 in. The cars are built for a seating capacity of 58 persons and are designed for curves having a minimum radius of 49 ft.

The underframe of the car is made up entirely of structural steel shapes and plates, hot riveted at all joints with steel angles or gussets and diagonally braced. The body is framed entirely of structural steel shapes, each side of the car forming a plate girder from

sills to letter board. The passenger compartment has 11 window openings on each side and the smoking compartment has 4 window openings on each side. The interior finish is of best Honduras mahogany.

The cars are equipped with flush platforms with the platform floor level with the car floor. The right-hand corner of each vestibule is partitioned off for a motorman's cab. This partition is carried up to the ceiling and the cab is electrically heated.

In the underframing an angle measuring 6 by 3½ by 5/16 in. is used as the side sill. At each bolster an angle 6 by 5 by 7/16 in. is



STEEL CARS FOR CHICAGO & MILWAUKEE. The underframe of the car is made up entirely of structural steel shapes and plates, hot riveted at all joints with steel angles or gussets and diagonally braced

used, its short leg being riveted to the long leg of the side sill, which is placed horizontal. The bolster is an 11-in. steel strut 1 in. in thickness. This bolster is fastened below a $\frac{3}{4}$ -in. top member. From a point $10\frac{1}{2}$ in. from the outside of the side sill the bottom member of the bolster is stretched down by means of a 6-in. H-beam and spacers so that its horizontal direction falls $14\frac{1}{2}$ in. below the floor level and extends for a distance of $14\frac{1}{2}$ in. on each side of the longitudinal center of the car. The side sills rest on end sills formed of 6-in., 10 $\frac{1}{4}$ -lb. channels and $\frac{1}{2}$ -in. steel plates. The bumpers are 6-in., 10.5-lb. channels. They are carried on 6-in., 23.8-lb. H-beams placed 14 in. on each side of the longitudinal center of the car. These H-beams come directly under the steel plates of the end sills, the 6-in. channels extending only between the H-beams and from the H-beams to the corner posts. The H-beams are riveted to the sill channels by means of 5 by 5 by $\frac{3}{8}$ -in. angles. The diagonal bracing at each bolster consists of 4 by 4 by $\frac{5}{16}$ -in. angles riveted to the side sills near the end sill and at an

equal distance on the other side of the bolster and brought in so that they extend parallel with the H-beams and are fastened to them by means of $\frac{3}{8}$ -in. plates. At a point 2 ft. $10\frac{7}{8}$ in. in front of the bolster and also at a point 2 ft. 7 in. toward the center of the car from the bolster the diagonal angles are reinforced by cross members of 2 by $1\frac{1}{2}$ by $\frac{3}{16}$ -in. angles. At a distance of 5 ft. toward the center of the car from the bolster an 8-in., 11 $\frac{1}{4}$ -lb. channel cross member is used, being fastened to the side sills by 6 by 4 by $\frac{3}{8}$ -in. angles and by 6 by 6 by $\frac{3}{8}$ -in. angles. At a point 7 ft. 6 in. toward the center of the car from this channel a 5-in., 9-lb. channel cross member is used. Between these 2 channels there extend two 5-in., 9-lb. channel longitudinal members, which are fastened to the cross members by 5 by 5 by $\frac{3}{8}$ -in. angles and by 5 by 3 by $\frac{5}{16}$ -in. angles. Spaced almost equi-distant between the 8-in. channel and the 5-in. channel cross members there are used two 3-in., 4-lb. channels which extend from the side sills to the 5-in. channel longitudinal members and between these members, being fastened to

the side sills by 6 by 3½ by 5/16-in. angles and to the longitudinal channels by 5 by 3 by 5/16 angles. Diagonal braces formed of 2½ by 2½ by ¼-in. angles and connected where they cross by a 5/16-in. plate, are fastened to the side sills by 5/16-in. plates at points just inside the 8-in. and the 5-in. channel cross members. This structure, with longitudinal channels, cross channels and diagonal bracing, is used 3 times between the 8-in. channel cross members which fall 5 ft. toward the center of the car from each bolster.

The unusual feature of this underframing is that the cars have not the continuous center sills gen-

erally found in heavy framing, the buffing and pulling strains being transmitted to the side girders. Although this constitutes a novelty for interurban service, it conforms to the most modern practise in the design of the side-girder steel car, in that it permits a more uniform distribution of the buffing and pulling strains throughout the car frame and provides, at the same time, a relatively light-weight structure. The heavy framing in the vestibule protects the car against the destructive effects of collisions. The arrangement of the structural shapes in the body-bolster panel is also rather unusual and gives a rigid structure.

Solid-forged side frames, with low end frames, fold-over gusset plates, bulb angle transoms, double-and single-corner forged transom brackets, "Half-Ball" brake hangers, friction springs at the bottom of the bolster swing links, short bearings for the equalizing bars in pockets on the journal boxes, pressed steel pedestal wear plates or gibs, planed faces of the pedestals to give an accurate fit to the gibs, oil-retaining center bearings—all these things are important features—distinctly Brill features—of the Brill 27-M. C. B. Truck.

MOTOR CAR FOR BRIDGETON & MILLVILLE

THE Bridgeton & Millville Traction Company, which operates the Bridgeton Rapid Transit Company and which is itself owned by the American Railways Company of Philadelphia, recently received from The J. G. Brill Company a motor car of the type illustrated. This car was similar to the type furnished the company on a previous order, with the exception of changes made in the arrangement of the platform. In each case the platform was 6 ft. in length. In the previous order, however, a 3-leaf door was used,

with an opening of 4 ft. 7 in., while in the car illustrated a 2-leaf door, opening 3 ft. 10 in., was used. The doors open on both sides of the platform.

The principal dimensions of the car are: Length of body over corner posts, 29 ft. 6 in.; length of car over bumpers, 43 ft. 2 in.; length of platforms, 6 ft.; length of smoking compartment, 9 ft. 5 in.; center of side posts, 2 ft. 8 in.; width over sills, including sheathing, 8 ft.; width over posts at belt, 7 ft. 11 $\frac{5}{8}$ in.; width of aisle, 21 in.; width of seat, 35 $\frac{3}{8}$ in.; height from track



MOTOR CAR FOR BRIDGETON & MILLVILLE. Slat seats were employed in the interior of the car, which was finished in cherry, stained mahogany



MOTOR CAR FOR BRIDGETON & MILLVILLE. The car was similar to the type of a previous order, except for changes in the platform. At its destination it was mounted on Brill 27-G Trucks with a 4 ft. 6 in. wheelbase. The photograph shows the car mounted on shop trucks

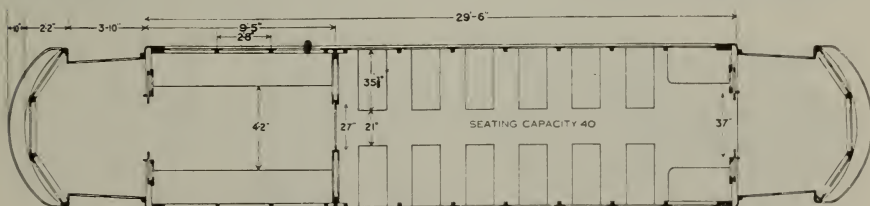
to underside of side sills, 2 ft. 9 15/16 in.; height from underside of side sills over trolley boards, 8 ft. 8 15/16 in.; height from floor to center of headlining, 7 ft. 10 1/8 in.; height from track to step, 15 in.; step to platform, 14 in.; platform to floor, 9 in.

The car, which has a seating capacity of 40 persons, is finished with cherry, stained mahogany. It was erected on Brill 27-G trucks, with 33 in. wheels. The car is equipped with 4 motors of 40 hp. The car, without the motors, but with air brake equipment, weighs 22,100 lb.

In the underframe the side sills, 5 by 3 by 3/8-in. angles, are carried

on 10-in. 15-lb. channel end sills and connected by three 4-in., 5.25-lb. channels spaced 3 ft. 7 1/2 in. apart at the center of the car. These transverse channels are riveted to the side sills by angles, those on the 2 outside channels being 6 by 3 1/2 by 3/8 in. and those on the center member 6 by 3 by 3/8 in. Diagonal stays tied by web plates to the inside corners of the two extreme transverse channels form an additional brace.

The bolsters are placed 6 ft. 3 in. from the corner posts. The bottom of the bolster, which is 9 in. deep, measures 2 ft. 5 1/4 in. from the rail. The lower edge of the bolsters drops 4 11/16 in. below the underside of



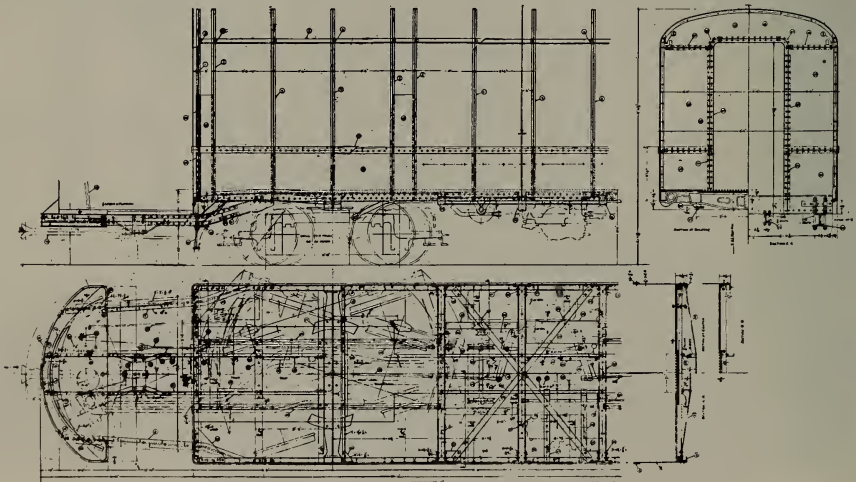
MOTOR CAR FOR BRIDGETON & MILLVILLE. Length of body over corner posts, 29 ft. 6 in.; length over bumpers, 43 ft. 2 in.; centers of side posts, 2 ft. 8 in.; height from track to underside of side sills, 2 ft. 9 1/8 in.; height from underside of side sills over trolley boards, 8 ft. 8 1/8 in.

the side sills, which in turn measures $6\frac{1}{16}$ in. below the floor level. The floor is laid on $2\frac{1}{2}$ by 3-in. wooden members bolted to the side sills and on beams placed transversely. Of these latter there is one 4 by $2\frac{1}{2}$ in. placed 3 ft. 2 in. forward of the bolster, one 3 by $2\frac{1}{2}$ in. placed directly in front of the bolster, one 4 by $2\frac{1}{2}$ in. placed 2 ft. 11 in. back of the bolster, toward the center of the car.

In the upper structure the belt is placed 2 ft. 5 in. above the underside of the side sill. The Tee-shaped side posts are continuous, forming the roof-arch overhead. The first side post in the smoking compartment falls 8 in. in from the corner post. There are 3 windows in the smoking compartment, the side posts being spaced 2 ft. 8 in. apart. The door separating the compartments is hung in a space provided by spacing the posts 12 in. Beyond this door the side posts are spaced equi-distant at 2 ft. 8 in.

The platform is supported on 2 outside knees of 6-in., 13-lb. channel. These channels are augmented by 2 by 2 by $\frac{1}{2}$ -in. angles. In addition there are two center members, placed with 18 in. between their inside limits, of 4-in. 5.25-lb. channel. These members are bent upwarp more sharply than the outside knees and run back just below the flooring to the bolster, to which they are riveted by a web.

At the center of the car the floor is reinforced by a strut which is riveted to the bottom flange of the side sill and which is stressed by channels and spacers placed 10 in. from the center and dropping the strut down $7\frac{3}{8}$ in. from the transverse member. At a distance of 3 ft. $7\frac{1}{2}$ in. from this strut, or directly beneath the flanking transverse channels, there are placed similar struts which, by means of a channel and a $\frac{3}{8}$ -in. spacer, are stressed to reinforce the floor, falling $4\frac{3}{8}$ in. below the channel.



MOTOR CAR FOR BRIDGETON & MILLVILLE. The side sills are carried on 10-in. 15-lb. channel end sills. The side posts are T-shaped

OPEN CARS FOR BOSTON & WORCESTER

THE Wason Manufacturing Company, of Springfield, Mass., recently delivered to the Boston and Worcester Street Railway Company five 14-bench open cars. These cars were built with an all-steel underframe and were equipped with the "Easy" Double Step.

The cars will be used over the

traffic. The distance between Park Square, Boston, and City Hall, Worcester, is 40 miles. The power station of the company is located at South Framingham, on one of the company's branch lines.

The cars measure 36 ft. 8 in. over the corner posts. The side posts are 32 in. apart. The length of the cars over the platforms is



OPEN CARS FOR BOSTON & WORCESTER. The cars have 14 benches and are equipped with the "Easy" Double Step. They are finished in oak. The company will use the cars for excursions and trolley trips for tourists. The distance from Boston to Worcester is 40 miles

lines between Boston, Brookline, Newton, Wellesley, Natick, Framingham, Southboro, Marlboro, Hudson, Northboro, Westboro, Shrewsbury and Worcester. The company is controlled by the Boston and Worcester Electric Companies.

The lines of the company are very well known by tourists who take trolley trips through the New England States during the summer months. Both Boston and Worcester are large distributing points for the interurban lines, and the company handles a very heavy

43 ft. 10 in. The platforms are each 3 ft. 7 in. in length; width of sills, including sheathing, 7 ft. 4 in.; width over posts at belt, 7 ft. 9 $\frac{7}{8}$ in.; extreme width of cars, 8 ft. 1 $\frac{1}{2}$ in.; height from track to underside of side sills, 33 in.; height from underside of side sills over trolley board, 9 ft. 3 $\frac{1}{2}$ in.; height from floor to center of headlining, 7 ft. 15 $\frac{3}{8}$ in.; track to step, 15 in.; step to step, 13 in.; step to floor, 13 in.

The cars are finished in oak. They have a seating capacity of 70 persons. The total weight of the

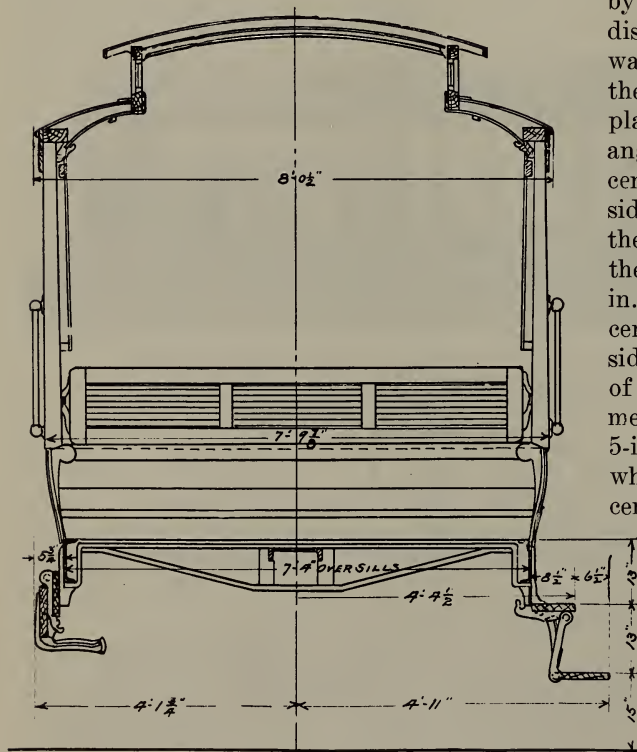
cars is 48,500 lb., which is divided as follows: Weight of car body less electrical equipment, 17,600 lb.; weight of electrical equipment, air brake and fenders, 2,800 lb.; weight of trucks, 16,200 lb.; and weight of motors, 11,900 lb.

In the underframing of the car, 8-in. 21.25-lb. channels are employed as side sills. Both the center sill and the buffer are of 10-in. 15-lb. channel. The bolsters are of the truss type of wrought iron and steel plates, both top and bottom

members being 8 by 1 in. At each bolster, which are placed 22 ft. apart, there is used a steel plate 12 in. by $\frac{5}{8}$ in. by 8 ft. $7\frac{1}{2}$ in. riveted to the outside of the side sill, while to the inside of the sill there is riveted a steel plate, 6 in. by $\frac{5}{8}$ in. by 6 ft. At a distance of 49 in. each way from the bolsters there are placed 3 by 2 by $\frac{3}{8}$ -in. angles. These angles are fastened to the center sills and to the side sills by means of angle-irons. The end sill is of 5 by $3\frac{1}{2}$

by $\frac{1}{2}$ -in. angle. At a distance of 30 in., in toward the bolster from the end sill, there are placed 3 by 2 by $\frac{3}{8}$ -in. angles, riveted to the center sill and to the side sills by angles. At the center of the car there are 3 by 2 by $\frac{3}{8}$ -in. angles riveted to the center sill and to the side sills. At a distance of 36 in. from this center member there is used a 5-in. 9.75-lb. I-beam, which passes under the center sill and is riveted

to the side sills. Diagonal braces $2\frac{1}{2}$ by $\frac{1}{4}$ in. are also used in the underframing, two pairs being riveted to the center sill $5\frac{1}{2}$ in. either way from the center of the car and fastened with $\frac{3}{8}$ -in. rivets to the angles which fall 49 in.



OPEN CARS FOR BOSTON & WORCESTER. Diagram shows end elevation of car, giving mechanism of double step arrangement. With this step down on both sides, the cars have a width of 9 ft. 10 in.; with steps on both sides up, the cars have a width of 8 ft. $3\frac{1}{2}$ in. Height from track to underside of side sills, 33 in.; height from underside of side sills over trolley board, 9 ft. $3\frac{1}{2}$ in. The total weight of the car is 48,500 lb.

inside of the bolsters. These are used again in front of the bolsters, extending from a point on the bolsters well out toward the side sills to a point on the center sill about 19 in. in from the end sill, where they are crossed and riveted to the center sill. The buffer is riveted by angle irons to two 4 by 3 by $\frac{1}{2}$ -in. angles, which are fastened by $\frac{1}{2}$ -in. rivets to the center sill.

The corner and side posts of the car are of ash. The flooring is of 13/16-in. narrow yellow pine. The roof, which is of the monitor type,

is strengthened with concealed rafters $\frac{5}{8}$ in. thick, bent to the shape of the roof. The double step arrangement is one of the best features of the car, one of its greatest advantages being its balancing device, which eliminates the jarring incident to lowering the steps. With the steps on both sides folded the car measures 8 ft. $3\frac{1}{2}$ in., and with the steps on both sides down, it measures 9 ft. 10 in. The cushions of the seats are of spring, covered with rattan. The backs are curved and are made of maple slats.

MULTIPLE DUMP CARS FOR SPRINGFIELD AND WORCESTER

TWO multiple dump cars for the Springfield Street Railway Company, of Springfield, Mass., and one car for the Worces-

ter Consolidated Street Railway, of Worcester, Mass., both of which companies are controlled by the New England Investment & Secur-



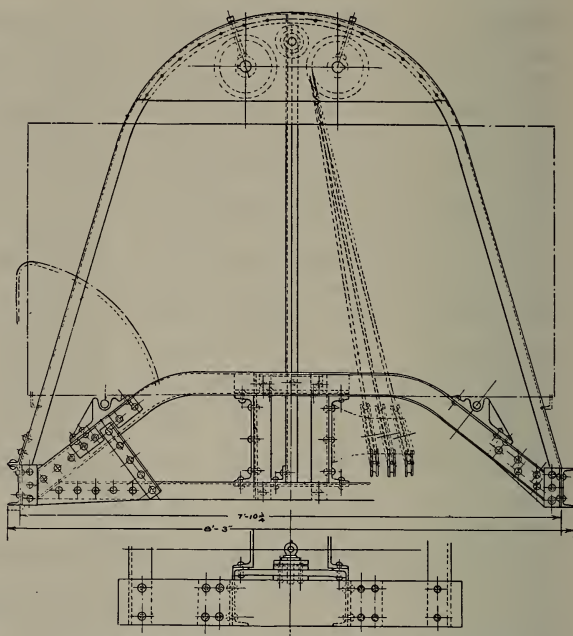
DUMP CARS FOR SPRINGFIELD & WORCESTER. The apron dumps the contents of the bodies clear of steps of passing cars

ity Company, were recently completed at the plant of the Wason Manufacturing Company, Springfield, Mass.

These cars were designed especially to handle the heavy service incident to road construction, such as transportation of trap-rock and other weighty materials. For this reason the cars were built entirely of metal, with the exception of the cabs at the ends. These cabs were built of wood, strongly framed, and were given sufficient size to furnish plenty of room for the 2-man crew without unduly lengthening the car.

Each car has 3 dump bodies which are operated by means of hoisting apparatus driven by a crane motor. This motor has the desirable feature of being built so that it is cut off automatically when the dumpy is raised high enough to empty its contents and when it is lowered into its normal position. This feature protects the motor and dumping mechanism against possible damage from careless or inexperienced operation.

The car has a total capacity of 18 cubic yds., each dumpy having a volume of 162 cubic ft. Four transverse arches resting on the side sills carry the operating rigging and permit the bodies to be dumped at either side of the track.



DUMP CARS FOR SPRINGFIELD & WORCESTER. The transverse arches re-lying on the side sills carry the operating rigging. Their construction permits the bodies to be dumped on either side of the car. The car has a total capacity of 18 cu. yd. Weight of body, less electrical equipment, 27,900 lb.; weight of trucks, less motors, 8,000 lb. each; weight of electrical equipment, including motors, 16,160 lb.; total weight, 60,060 lb.

The side boards open and close automatically with the raising and lowering of the dumpy body, the lower section acting as an apron which projects the contents of the car out and away from the track and delivers it at such a distance from the rails that it will clear the steps of passing cars. The 3 bodies may be dumped and returned to their normal positions in from 2 to 3 minutes, thus making entirely feasible the hauling of material and dumping at any point on the line without interfering with the running passenger schedule.

The dumpy bodies are built of steel plates, stiffened with channels

and tied together at the corners with angles and at the 4 top corners with gusset plates.

The cars have a length of body over buffers of 41 ft. and a width of 8 ft. 3 in. They are mounted on Wason No. 31 trucks. The height from the track over the trolley board is 11 ft. 6½ in. and the height from the top of the rail to the top of the box is 8 ft. 5 in. The trucks have a wheelbase of 6 ft. 4 in. with 33-in. wheels and 4¼ by 8-in. M. C. B. journals. There are 4 motors of 65 hp. capacity each and operated at 600 volts.

The car body without the electrical equipment weighs 27,900 lb., the electrical equipment and motors complete 16,160 lb. and the trucks 8,000 lb. each without the motors, making a total weight of 60,060 lb.

The underframe is built of structural shapes and plates. There are 2 center sills of 15-in., 33-lb. channel, spaced about 1 ft. apart and extending from bumper to bumper, where they are bracketed to 12-in., 20½-lb. channel end sills. The side sills of 7-in., 9¾-lb.

channel are about 1 foot below the level of the center sills and serve as supports for the channel arches which carry the operating rigging. Six crossings of truss form which also serve as supports for the dumping bodies, 2 under each body, are made up of a 4-in. channel top member brought over the center sills and a 3-in. angle bottom member, braced diagonally with angles. An additional cross member, located between the second and third dumpies, carries a cast strut for the two 1½-in. round iron truss rods which extend between the bolsters. The motor-man's cab is on a line with and supported by the center sills and 5 by 3 by ¾-in. angle outer sills which extend from the end sill to a cross member at the end of the side sills. The operator's cab at the rear, measuring 10 ft. in length, is supported in the same manner, with the addition of two 4-in. channel intermediate longitudinal sills. The bumpers and draft rigging are suspended underneath the end sills by angles and are riveted to the center sills.

The long links in the Brill "Radiax" Truck permit a considerable radial movement of the axles without the links assuming an excessive inclination. Automatically the carbody is held steady on straight tracks and permitted free radiation on curves.

SUGGESTIVE SUBJECTS

NOTE.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

THE BAKER'S DOZEN

THE other day I strolled into a baker's shop and asked for a dozen rolls, the breadman having passed us by on his morning rounds. Neatly and quickly they were given me—so quickly that later on, when I discovered that instead of a dozen rolls there were thirteen in the bag, I reasoned that haste had been the cause of the extra roll's being. When next I chanced into the shop of my friend the baker I told him of my discovery and he was completely overwhelmed—not at the mistake which I thought I had discovered but at my ignorance in never having heard of the Baker's Dozen.

"What," I queried, "may the Baker's Dozen be?"

"Good measure, friend," was his answer.

That baker is doing business at the same stand and making money by the fistsful. What's the reason? Good measure. Think it over yourself. What in the way of good measure are you giving the railway company that hands you your weekly pay envelope? Are you earning merely what you get? If you are, it's a hundred-to-one-shot you never will get any more. Every big man is earning more than he gets—sometimes twice as much. That's his good measure. He gives it not so much because he wants to please the company for which he works but because he wants that company to pay him more and more and more as time goes on. Keep your ability and your productiveness several jumps ahead of the figures on your pay envelope and there will be no doubt of your ultimate success.

Don't worry about your job, either while you are on your run or after your work for the day is over. Worry generally indicates lack of confidence and that does not bring success. However, keep your mind on your work while you are at it, think of the many ways you can please the company which operates the road for which you work, if not directly at least indirectly, by being courteous and even-tempered with its patrons. But don't worry about the promotion that seems to be so slow in coming and which is keeping you tied to a bellcord in the meantime. There are lots of jobs far worse than being a railway man and one of them is being a discontent.

Anything that does not have a soul is dead. How many jumps are you from the sod?

RAILWAY MAN AN EDUCATOR

RUNNING a trolley car is just as important to mankind as is being president of some great institution of learning. Education and travel go hand in hand. Travel is the greatest educator, in fact. The railways are our best civilizers. If you are part of one, you may be sure you are helping your fellow-being. There *have* to be trolley-men.

Remember, the proper attitude, which incidentally will always be the attitude of the road, is that "the patron is always right."

James J. Hill says, "Trust in the Lord and run no empties." How many empties are you hauling back and forth along the railways in your brain each day? Get something worth while to think about when you have time to think.

Are you "fit" to take your run when you report? Is your car "fit" to take its passengers? Are you "fit" for promotion? Wonderful word that "fit," which Kipling made famous with his Terrence Mulvaney.

One of the most efficiently managed railroads in the country maintains that it costs practically no more to run loaded cars than half-filled ones. Hence, the rule on that road is loaded cars. The cost of hauling being granted the same, the income received when the material hauled is delivered is double. How about yourself? Are you dragging around half-baked ideas, thoughts and ideals? Think of the increased profit to yourself if you fill up those idea-cars to their capacity.

One of the first things that should be bred in a railroad man is that the same mistake never should be made twice. Have you that firmly planted in you?

What do you know about the cost of a gong, a railroad tie, a fence-post, a strap, a window pane, a car seat, a trolley pole, a pair of wheels, or a journal box? Get an idea of the value of things and the efficiency expert will not get on your trail as a waster of material.

That "streak of rust" you are working on is just as surely God's handiwork as it is the work of the construction gang. Be sure that you are worthy to travel it each day.

Don't make the mistake of thinking your company is looking for faults, holding ever suspended just over your head your discharge papers. The real truth of the matter is probably that the company is watching you—but with an idea of promotion. Good companies are always on the search for merit to reward, talent to advance. Have you merit—talent? Then rest easy.

Try to think of life as a great, big interesting game and try to be on the winning side all the time. Keep your own score—and don't cheat in doing it.

Remember that there are no jobs on the road, no office, no position, that could not be quickly filled were the man who fills the place to drop out of the game. How about your own job? Are you holding on with both hands? And how about the job of the man next above you? Could you hold it down at a moment's notice?

In order to please the heads of the company for which you work, you first must please the patrons of your line.

Don't leave the controller of your life-car to peer up the road of progress for success to come bowling along toward you. Success never yet came down the track to meet a man. It is necessary always to catch up with it and board it while it is in motion. The man who can shift from the mechanism of the old car of habit to the operation of the new car of opportunity is the fellow that will ride in at the end of the line in best of trim without a hot-box and without a short-circuit in his brain wires.

Enthusiasm about your work—whether it be as motorman or conductor—will make for you a bigger booster up the ladder of life than could anything else. Get the enthusiastic habit.

COURTESY AND HAPPINESS

COURTESY and happiness are the cheapest things it is possible for man to attain. And, of the two, courtesy offers itself with the least difficulty. Happiness is a somewhat uncertain quantity, anyhow, but courtesy is measured with a yardstick.

Start with refraining from being discourteous. But don't stop there. That would be a very negative way of doing things. And success always means positive action.

Make your courtesy positive. Make it emphatic. Don't make it overbearing, but even that would be better than to have it tip the scales in the other direction.

Kindness is one of the first and most important attributes of a big man. Be kind and considerate even though the weather is hot, the run dusty and dirty and the passengers irascible.

Try being kind to some one person in some special way once every day, and then at night sit down and think about it and you will realize what real happiness means—thoughtfulness for other beings in this world with you.

Someone has said that out of kind thoughts, translated into courteous actions, dollars are coined. Isn't it true? Every business depends on patronage. Where would your employers' business go—along with your own job—if continued discourteousness and thoughtlessness cut down that much-to-be-desired patronage?



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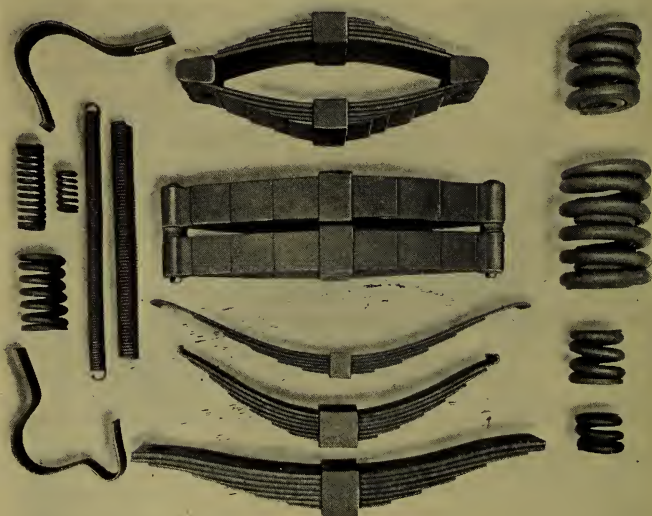
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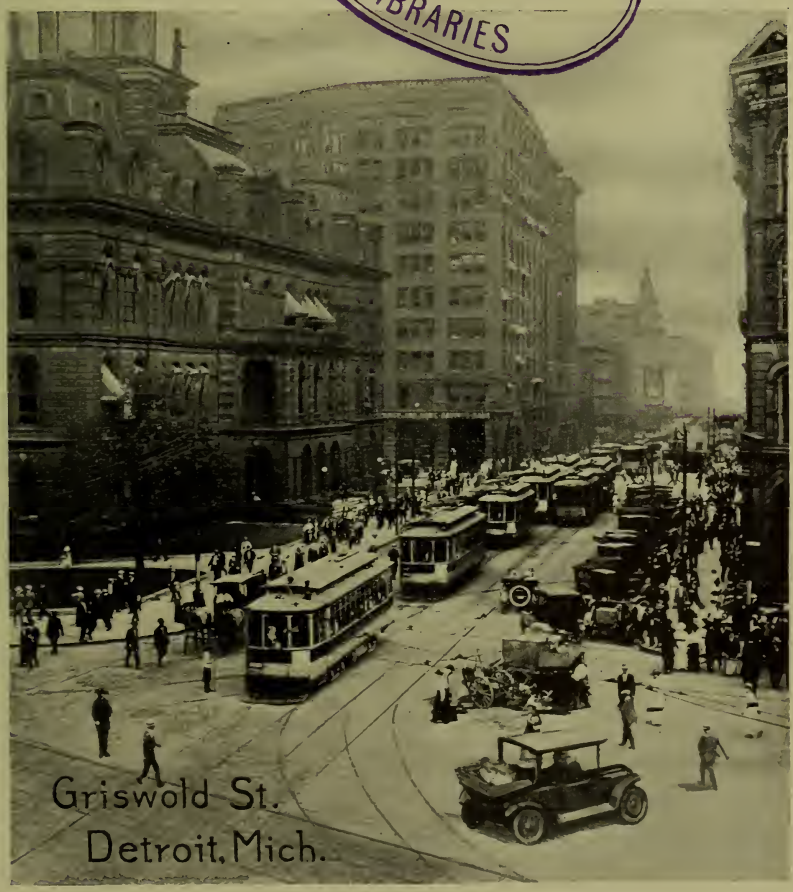
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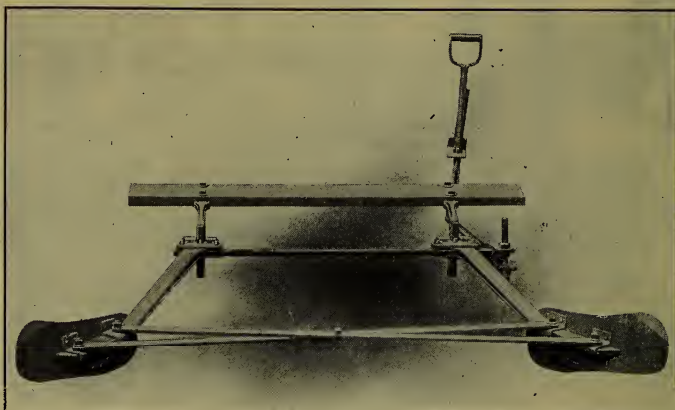
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THE BRILL TRACK SCRAPER

EFFICIENCY in keeping the tracks free of light snow, sand, and wet, slippery leaves in the fall and winter—that is what the use of Brill Track Scrapers means. Prevention of tie-ups in schedules caused by wheels slipping and spinning on wet tracks is assured to every line equipped with the scraper. Its use does not mean trouble of installation, for it may be attached beneath the platform of any car without blocking or cutting off timbers. And the cost is more than balanced by the better traffic service. The scraper is simple, but it does the work and does it well. Its three special features are its elastic arms, diagonal cross-bracing and its removable shoes. The elastic arms allow the blades to fly over obstacles and crossings, while the diagonal bracing furnishes the strength and rigidity in the right direction that is so vitally important, preventing bending and breaking. The removable shoes receive the wear, and these and the blades can be replaced at little cost.



Handwritten signature

PRESIDENT, INTERBOROUGH RAPID TRANSIT COMPANY, OF NEW YORK
AND NEW YORK RAILWAYS COMPANY

“The ability to succeed is inherent in every man. It differs only in degree. There is opportunity for every man to give the best that is in him. Perseverance is the keynote of success. The man lacking it or permitting it to lie dormant can never hope to rise above mediocrity.”

“Without physical strength to sustain one’s courage and perseverance, man soon becomes as the third rail without the ‘juice.’ ”

“All progress of the human race, all achievement and development, is exactly measured by the surplus energy put into the efforts to forge ahead.”

“The failure to cultivate the best that is in us retards success.”

“Disappointments develop character and cultivate patience and tolerance. Success is builded upon disappointments. Innovations and disappointments go hand in hand.”

“It is our duty not to jeopardize or destroy life but to preserve it. Safety first is the right way, and the right way is the reasonable way. In the case of doubt run no risks. Take the safe side. Watch your step! If you want to succeed in any walk of life, watch your step.”

THEODORE P. SHONTS.

OCTOBER 15, 1915

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THEODORE P. SHONTS

THEODORE PERRY SHONTS, President of the Interborough Rapid Transit Company, of New York, and the New York Railways Company, was born in Crawford County, Pa., in 1856. As a boy he went with his parents to Iowa, where he received his early education. He attended public schools at Centreville, Iowa, and matriculated at Monmouth College, Monmouth, Ill., from which college he was graduated in 1876. He became an expert accountant and subsequently was employed to standardize and simplify the methods of bookkeeping in the banks of Iowa. Then he studied law and for a time practised that profession at Centreville. Mr. Shonts entered the active railroad field in connection with the construction of certain portions of the present Iowa Central Railroad, subsequently being placed in charge of the construction work. Afterward he built the Missouri, Iowa and Nebraska, and later the Three I's—the Indiana, Illinois and Iowa—of which road he became the controlling owner. When the latter road was turned over to the New York Central system he obtained control and was made President of the Clover Leaf, the popular name of the Toledo, St. Louis and Western; and subsequently also became President of the Chicago and Alton, the Minneapolis and St. Louis, and the Iowa Central. In 1905 Theodore Roosevelt, then President, asked Mr. Shonts to take charge of the building of the Panama Canal. Mr. Shonts accepted and for two years he worked hard and well. It was during Mr. Shonts' administration, popularly known as the "Railroad Regime at Panama," that yellow fever was eliminated from the Isthmus, and the Canal Zone made sanitary; the present commissary and supply system established; the machinery for the construction of the Canal designed, purchased and installed; the type of Canal worked out and agreed upon by the Congress; the force of skilled and unskilled labor recruited and housed; and the work well launched toward completion. At the end of two years, pursuant to his agreement with the President that he might leave when the Panama Canal work was a "going concern," he left to take up the reins of the office which he now holds in New York.

INTERURBAN CENTERS AND INTERURBAN CARS

DETROIT

MICHIGAN, eighteenth largest state of the Union, with a total area of more than 57,000 square miles, consists for the most part of gently undulating lands at a slight elevation above the lakes by which it is bounded. In the southeastern part of this state on the Detroit River, which connects Lakes St. Clair and Erie, is situated Detroit, the greatest automobile manufacturing city in the world as well as one of the best designed and most beautiful cities in the United States. The interior of the state in the vicinity of Detroit abounds with rapid streams with numerous falls, which supply cheap power, indicating the advantages which the city enjoys for its many plants and factories. The city of Detroit in 1910 had a population of nearly 475,000, but its present estimated population, as given by the city directory, is 725,000.

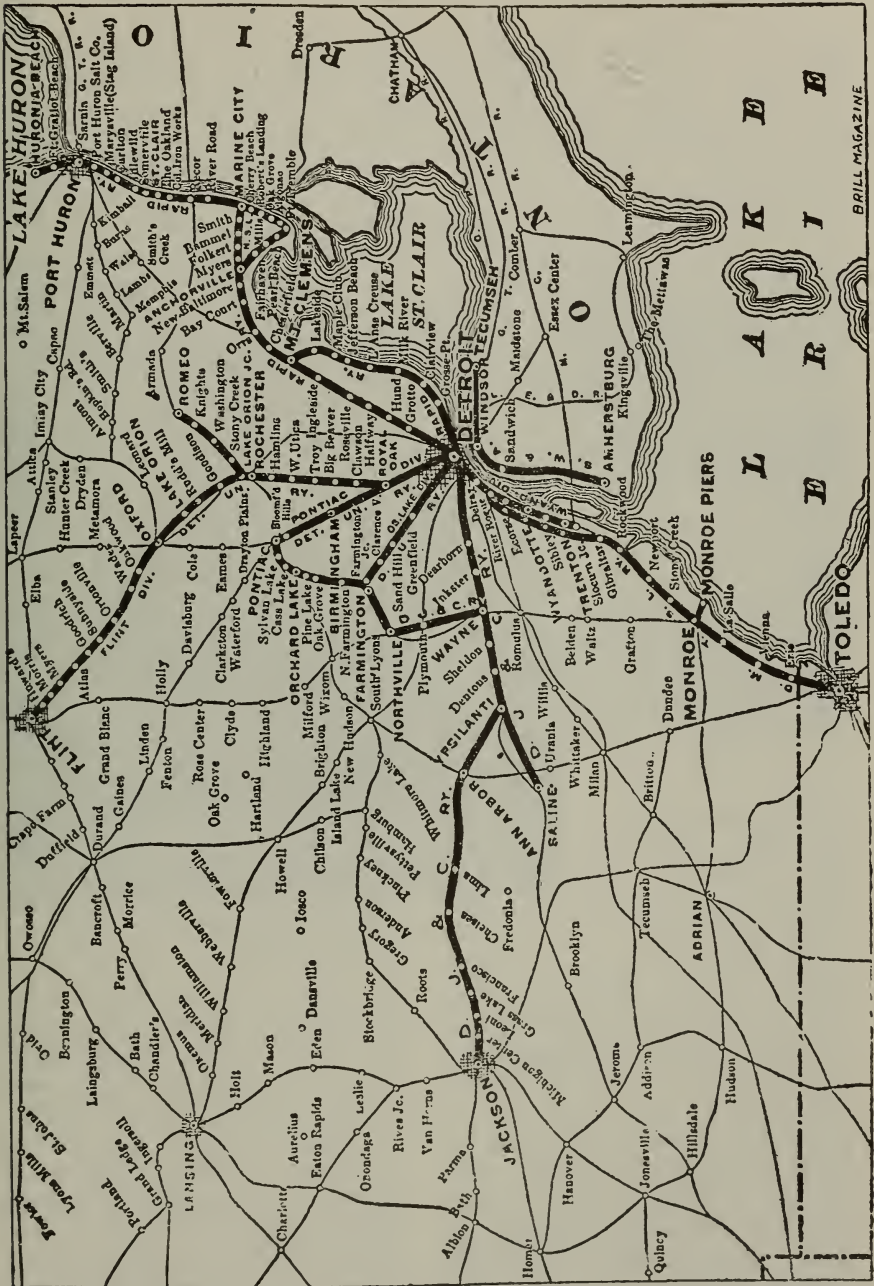
The state is divided into two peninsulas, the upper or northern peninsula, which runs east and west between Lakes Superior and Michigan, and the lower or southern peninsula, which runs north and south between Lakes Michigan and Huron. Of the two peninsulas the lower is the larger. The northern peninsula is rugged mountainous "old land," not completely worn down by erosion, and the southern part is a portion of the old coastal plain, whose layers

contain salt, gypsum and coal. It is in this southern peninsula that Detroit lies.

The southern peninsula ranges from about 600 to 1,100 feet above sea level. Both Lakes Michigan and Huron are about 600 feet above sea level, and the peninsula varies from 100 to 500 feet above the level of these two lakes. This land between the two lakes is for the most part level and slightly rolling, although there are low marshlands in many sections, and in the northern part of the peninsula there is a plateau of considerable dimensions.

Half the land of the state is devoted to farming, and the interurban lines out of Detroit, tapping these farming districts, do a good freight business as the result. The state is also largely given over to stock raising, sheep being the biggest product, with cattle, hogs and horses ranging next in importance. The size of the sheep-raising industry makes wool production a very important business. Michigan also produces the bulk of the peppermint crop of the United States, and is in the front rank as a fruit state. Barley and buckwheat are grown chiefly in the eastern part of the lower peninsula south of Saginaw Bay, which is the district upon which the interurban lines centering in Detroit feed.

From 1890 to 1901 Michigan ranked first in the United States as



an iron-producing state, Minnesota taking the lead in 1901. In 1907 the product was almost 12,000,000 long tons. This wealth of raw material, coupled with good transportation facilities and natural advantages for the obtaining of the power to drive the machinery, has brought the city of Detroit to its present position at the top of automobile manufacturing cities of the world. The leading manufacturing cities of the state, in order of their importance, are Detroit, Grand Rapids, Kalamazoo, Battle Creek, Saginaw, Flint, Jackson, Lansing, Muskegon, Bay City and Port Huron. Of these cities the lines of the Detroit United Railway, which operates all the interurban lines radiating from Detroit, tap Flint, Jackson and Port Huron. A large part of the business done by these interurban lines comes from Toledo, Ohio which is connected with Detroit by the Detroit, Monroe & Toledo Short Line Railway.

The soil of southeastern Michigan is for the most part a dark clay or muck, becoming in the central part of the peninsula a light, sandy loam. Throughout the whole state, however, the soil is rich in mineral elements and varies chiefly in pro-

portions of vegetable loam, clay, sand or gravel. The climate of the lower peninsula is influenced by the lakes; yet, the prevailing winds being westerly, it is in the western part of the peninsula that the moderation is greatest. The mean annual temperature is about 45 degrees, the month of July being the hottest month of the year and



INTERURBAN CENTERS AND CARS. Exterior of the Interurban Building in Detroit, the office building of the Detroit United Railway

February being the coldest. The mean annual precipitation is not far from 31 in., more than half of which falls during the growing months of May to October, and, the rain being evenly distributed over the southern part of the state, agriculture necessarily is a thriving industry.

Founded first in 1701 by the French, who named it Fort Pontchartrain, and passing from their

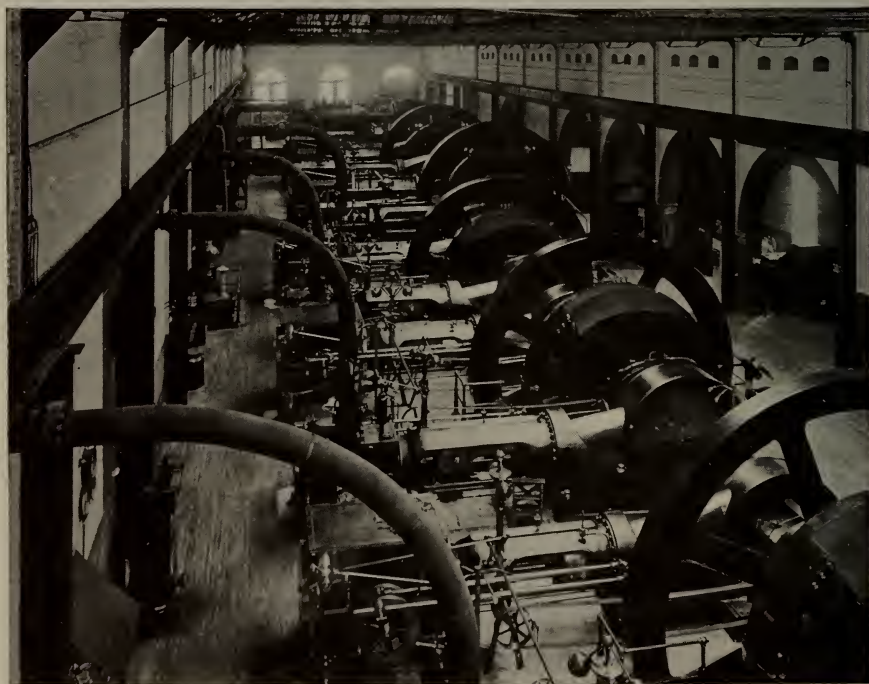


INTERURBAN CENTERS AND CARS. Lake Orion Station on the Flint Division of the Detroit United

hands into possession of the British, who called it Fort Lernault, and later into the hands of the American forces following the close of the War of Independence, when it was renamed Fort Shelby, Detroit finally was incorporated and given its present name in 1802. In 1805 it became the capital of the state, being succeeded by Lansing in 1847. In 1805 the city was practically wiped out by a great fire. Its rebuilding and persistent growth following that disaster show the spirit of progress with which the city has been imbued, which is also attested by the strides its manufactures have made.

In 1900 the city covered 29

square miles; in 1905 it had spread so that it included an area of 36 square miles, and in 1907 its total area was 41 square miles. Its area in proportion to its population is much greater than that of most of the large cities of the United States. This fact makes clear why the demand for trolley service is so great as to require one of the best regulated systems in the country to handle its traffic. When the city was built up again following its destruction in 1805, it was designed by Augustus B. Woodward, one of the territorial judges of the time and a great admirer of the city planning carried out in Washington, D. C. For that reason



Allis-Chalmers turbine installed in Station "B" of the Detroit United Railway
Engine-room of Station "B"



INTERURBAN CENTERS AND CARS. Trombly Sub-station of the Detroit United, located at Duboise and Trombly Streets, Detroit

Detroit has many beautiful wide streets, diagonal avenues forming, where they intersect with the other streets, little reservations or parks, and many larger parks. These parks are well scattered throughout the city and its suburbs, and in the summer many people are lured to them, thus creating quite a demand for traffic facilities.

The location of the city gives to its shipping and shipbuilding interests a high importance. All of the enormous traffic between the upper and lower lakes passes through the Detroit River. In 1907 the vessels that went through that river carried a total cargo valued at about \$700,000,000. This includes vessels which delivered all

or part of their cargoes to plants in Detroit, necessarily creating need for transportation about the city. The output of Detroit's manufacturing districts in 1906 totaled \$180,000,000.

Detroit is served by seven of the largest railroads in the country and is also reached by the Canadian Pacific. Two belt lines, one two to three miles and the other six miles from the center of the city, connect the factory districts with the railway lines. Trains are ferried across the river to Canada and boats are run to Cleveland, Port Huron, Toledo and other important points.

The system of the Detroit United Railway is one of the most



INTERURBAN CENTERS AND CARS. Lines of the Detroit United Railway north of New Baltimore on the Rapid Railway

extensive of any interurban system in operation. It includes the lines of the Detroit & Port Huron Shore Line Railway (Rapid Railway System), the Sandwich, Windsor & Amherstburg Railway, the Detroit, Monroe & Toledo Short Line Railway, and the Detroit, Jackson & Chicago Railway. The company also controls the River Rouge Railway, the Almont & Northern Railroad, the Detroit and Highland Park Railroad and the Windsor & Tecumseh Railway.

Both the Windsor & Tecumseh Railway and the Sandwich, Wind-

sor & Amherstburg Railway are in Canada, Windsor being directly across the Detroit River from Detroit. The former line runs due east from Windsor to Tecumseh, on Lake St. Clair, and the latter runs almost due south through Sandwich to Amherstburg. Both lines are short, as compared with the other interurban lines of the system.

The Pontiac Division of the company traverses Woodward Avenue, Detroit's principal residence section, passes through a rapidly growing suburban section known as



INTERURBAN CENTERS AND CARS. Near South Rockwood on the Detroit, Monroe & Toledo Short Line Railway

Highland Park and thence to Palmer Park, a natural park which has many visitors and which therefore helps increase the business of the company, then past the State Fair Grounds and two large cemeteries to Royal Oak, the center of a rich farming district. After a run of about six miles Birmingham is reached, a prosperous town situated in a healthful region and among beautiful surroundings. The ride from Birmingham to Pontiac is noted for its many fine views. This division is also comparatively short—seventeen miles.

The Flint Division is one of the longer divisions of the road, having a total length of 68 miles. It branches off the Pontiac Division at Royal Oak, a station a short distance outside of Detroit, and runs due north to Rochester, where a branch bears off to the northeast to Romeo, the main line continuing northwest for a much greater distance, taking in Lake Orion and Oxford and terminating at Flint. From Romeo the Detroit, Alnont & Northern Railroad runs to Inlay City.

The Detroit, Jackson & Chicago

Railway extends from Detroit almost due west through some of the finest agricultural districts of the state to Jackson. At Ypsilanti, about half the distance from Detroit to Jackson, a branch bears off southwest to Saline, and at Wayne, almost midway between Ypsilanti

Huron on Lake Huron via Mt. Clemens and Marine City, the latter being located on the St. Clair River. Between Detroit and Mt. Clemens there are two routes, a direct route and one which follows the shore of Lake St. Clair the whole distance. At Anchorville, a



INTERURBAN CENTERS AND CARS. Bridge between Rockwood and South Rockwood on the Detroit, Monroe & Toledo Short Line

and Detroit, a branch runs north to Northville and from there northwest to Farmington. The latter is directly connected with Detroit by the tracks of the Orchard Lake Division. This railway is one of the largest of the whole system, operating for a distance of almost 90 miles.

The Detroit & Port Huron Shore Line Railway (Rapid Railway System) runs from Detroit to Port

station reached just before Marine City, there is a branch which runs down to Point Tremble, turning north again there and running to Marine City, where it again joins the main line. The operating distance of this railway is about 85 miles.

The Detroit, Monroe & Toledo Short Line Railway runs southwest from Detroit to Toledo, following roughly the shore line of Lake

Erie, after it leaves the Detroit River. There is also a branch line of the Detroit United Railway, proper, paralleling the tracks of the main line between Detroit and Trenton, taking in Wyandotte. Again, more than midway between Detroit and Toledo, there is a

extensive system the company has in service 1,403 closed passenger cars, 263 open passenger cars, 247 freight and construction cars, 36 line cars, 84 express cars and other miscellaneous equipment. Eleven power houses, whose combined capacity is 67,290 hp., furnish



INTERURBAN CENTERS AND CARS. Bridge located at Monroe, one of the important stations on the Detroit, Monroe & Toledo

branch line which extends to Monroe Piers, on Lake Erie. The length of this railway totals about 60 miles.

The whole system is operated over a territory whose total tributary population is 1,125,000, the population of Detroit being augmented by that of Toledo, 135,000; Jackson, 40,000; Flint, 50,000; Pontiac, 18,000; Port Huron, 20,000. For the operation of its

power to the company's lines. The company also has two storage batteries with a combined capacity of 4,500 amperes and eighteen substations with a combined capacity of 18,900 kw.

The company has in operation over 800 miles of track, which includes about 80 miles of side and yard tracks. A large percentage—about 600 miles—of this trackage is on the interurban lines of the

company, where road construction has been on both public highways and private right of way. During 1914 the company carried on all its lines a total of 346,180,400 passengers, of which number 252,961,221 were revenue passengers, 85,354,131 rode on transfers and 7,865,048 were employees. The total car mileage for that year was 44,883,720.

The company makes through operation of limited cars with the Michigan Railway at Flint, with the Michigan United Traction Company at Jackson and with the Lake Shore Electric at Toledo. Added traffic is of course thrown the company's lines through these connections.

The cars in use by the company

on its city lines are for the most part of the composite underframe type, Pay-As-You-Enter cars. They are designed for single-end operation, the multiple unit control being used on the interurban lines but not on the city cars. The current is collected by overhead trolley all over the system, and the cars are operated singly and as trailers. The maximum speed of operation on the city lines is 18 miles per hour, the cars making an average of 9 stops per mile.

The length of these cars over the bumpers is 44 ft. 7 in., with a width over the side sheathing of 8 ft. 5½ in.; length over vestibules, 44 ft.; seating capacity, 42 persons; centers of bolsters, 18 ft. 9 in.; weight of carbody, 21,100 lb.; total



INTERURBAN CENTERS AND CARS. Type of freight car in use on the lines of the Detroit United



INTERURBAN CENTERS AND CARS. Typical car in use on the lines of the Detroit, Monroe & Toledo

weight of car and trucks fully equipped, 47,350 lb.

The interurban cars used by the company have a length over vestibules of 56 ft. 5½ in.; length over bumpers, 58 ft. 3½ in.; width over sheathing, 8 ft. 9 in.; seating capacity, 52; centers of bolsters, 34 ft. 2½ in.; total weight of car,

81,800 lb. These cars are designed for single-end operation and are run both singly and in trains. There are four motors to each car, each motor being of 100 hp. The cars are operated at a maximum speed of 55 miles per hour and are used both for limited and local service.

For more than 20 years the Brill 21-E Truck has been the standard single-truck for cars from 18 to 23 ft. over the body corner posts. Wide-wing journal boxes have brought its riding qualities up to a maximum.

SINGLE-TRUCK CARS FOR NORTON & TAUNTON

BRILL 21-E TRUCK

NORTON, Massachusetts, about 30 miles south of Boston, occupies the center of a triangle formed by Taunton, Attleboro and Mansfield, all three of which are connected with each other and with Norton by the lines of the Norton & Taunton Street Railway Company. The main line of this railway extends from Taunton—in which city the cars are operated for a short distance over the rails of the Bay State Railway Company, making a loop circuit of the center of the city—through

Norton to Attleboro, where the cars also traverse a loop in the business center. This makes a run of $14\frac{1}{2}$ miles.

A branch line extends from Norton to Mansfield, a distance of 5.6 miles. In both Attleboro and Taunton the cars pass the steam railway station in making their loop circuit. In Mansfield, after passing through the center of the town, the cars have a terminus at the Mansfield railroad station.

The loop in the center of Taunton passes around the old Taunton



SINGLE-TRUCK CARS FOR NORTON & TAUNTON. The cars are arranged so that they may be adapted to one-man operation if the company desires



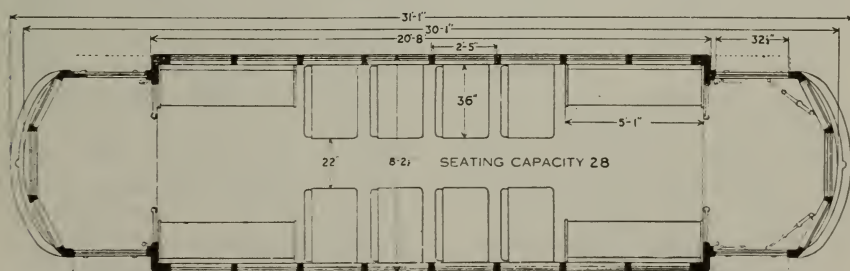
SINGLE-TRUCK CARS FOR NORTON & TAUNTON. The use of the Brill 21-E truck on this car makes it easy for the equipment to negotiate the many short curves of the line

green, a name given to a little park in the center of the city, dating back to colonial days.

This part of Massachusetts is one of the most diversified manufacturing sections in the state, the looms of its textile mills contributing largely to the volume of its production. Attleboro, sometimes called "The Home of Jewelry," produces all grades of jewelry from the best to the cheapest. Characteristic of the state, this section is thickly populated. Mans-

field has a population of 4,800; Taunton, 38,000; Attleboro, 19,000; and Norton, 3,000. This gives 64,800 as a total population for the four, which total is augmented by rural and suburban dwellers in this and adjoining territories.

The lines of the road run through a very flat country, there being practically no grades, though there are several short rises of approximately 4 per cent. The track was laid at a time when the location requirements contained the clause,



SINGLE-TRUCK CARS FOR NORTON & TAUNTON. Length over corner posts, 20 ft. 8 in.; over bumpers, 31 ft. 1 in.; height from track to underside of sub-sills, 2 ft. 2 3/4 in.; track over trolley boards, 11 ft. 7 1/2 in.; total weight, 21,800 lb.

"The track shall be laid to conform to existing grades and curves in the present highway," and the curves are very numerous and some are of short radius, the shortest of which is 35.89 ft. There are 5 others also under 40 ft.

The running time of the cars between terminals in Taunton and Attleboro is 1 hour and 8 minutes. A short layover is allowed in Attleboro for the purpose of train connections, with no layover in Taunton. The running time on the branch road between Norton and Mansfield is 25 minutes, the average schedule calling for a speed of about 12 miles per hour, including stops.

Practically all of this company's equipment, which consisted of single- and double-truck cars, was destroyed December 8, 1914, by fire. This equipment is being replaced by light-weight, single-truck cars, which now are generally considered by railway men as more efficient and economical than the larger, heavier cars. It is not the intention of this company to use any but the single-truck cars in the future. In fact, the company is seriously considering the subject of one-man operation. A study also is being made for the purpose of ascertaining if the pre-payment plan is practicable on this line, which has zone collections, but has heavy traffic in its two terminal zones at Taunton and Attleboro, where the pre-payment plan may be adopted at some future time.

The heaviest collecting points are in the first zone out of Attleboro and the first zone out of Taun-

ton. In Attleboro particularly the short rider makes the first mile a fairly busy collecting point, while in Taunton, due to the fact that the village of Oakland is located about 2 miles out of the city, the time in which the fares from a heavy load may be collected is more advantageous.

Traffic in the summer time increases approximately 40 per cent. over that of the winter months, and is mostly pleasure traffic, although the company does not operate a railway park. A public park of the city of Taunton is located along the line about 5 miles from the center of the city and is largely patronized during the summer months.

Seven cars of the type illustrated, mounted on Brill 21-E trucks, recently were built for this company at the plant of The Wason Manufacturing Company, of Springfield, Mass. Although the line at present is operating these cars under two-men crews, the operating mechanism of the double-folding doors of both sides of the platform, which mechanism is controlled by a lever near the central window of the vestibule, is such that it may be adapted to one-man operation if the traction company decides to inaugurate this method on its lines at some future date.

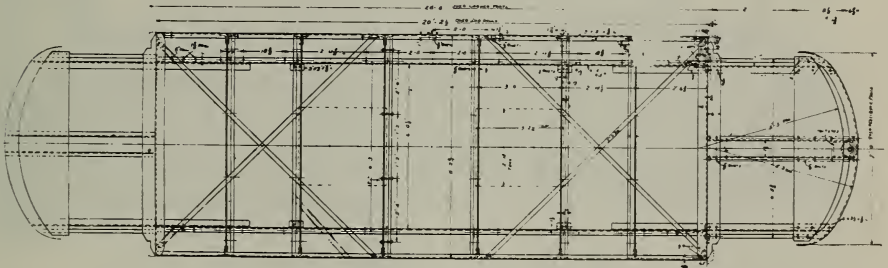
Much attention was given to both the construction and equipment in making these cars of light weight and also maintaining sufficient strength to meet the demands of the service. Practically the whole structure is of steel and at each body end the usually

weighty bulkhead is replaced by pipe stanchions which form a convenient grab-handle.

The principal dimensions of the cars are: Length over corner posts, 20 ft. 8 in.; over bumpers, 31 ft. 1 in.; width over sills, 8 ft. 2 $\frac{5}{16}$ in.; centers of side posts, 2 ft. 5 in.; height from track to underside of sub-sills, 2 ft. 2 $\frac{5}{8}$ in.; track over trolley boards, 11 ft. 7 $\frac{5}{8}$ in.; wheelbase of truck, 7 ft. 6 in.; diameter of wheels, 33 in.; height from track to underside of side sill, 2 ft. 8 $\frac{7}{16}$ in.

by $\frac{3}{8}$ -in. angle outer knees and 4-in., 5 $\frac{1}{4}$ -lb. channel center knees, riveted to the outer flange of the end sills.

On each side the upper structure is formed into a girder by a steel belt rail fastened with rivets to each of the tee-shaped side and corner posts. The inwardly extending web of the angle top rail is utilized for attaching the concealed steel rafters with suitable steel brackets and supporting the Brill plain arch roof. Below the windows on the sides and vestibules



SINGLE-TRUCK CARS FOR NORTON & TAUNTON. The interior of the car is finished in cherry. Much attention was given to making the construction and equipment of these cars as light in weight as it was possible and still retain the strength necessary for the service.

The cars without the electrical equipment weigh 9,366 lb.; the electrical equipment and accessories weigh 1,834 lb.; the truck weighs 6,200 lb., and the motors weigh 2,200 lb. each, or 4,400 lb., making the total weight of the car 21,800 lb.

In the underframe 3 by 2 by $\frac{3}{8}$ -in. angle side sills are connected by 6 by 4 by 10 by $\frac{3}{16}$ -in. Z-shaped end sills, 3 $\frac{1}{2}$ by 2 $\frac{1}{2}$ by $\frac{5}{16}$ -in. angle crossings and are braced diagonally by 2 by $\frac{3}{4}$ -in. bars. Sub sills of 6-in., 10.5-lb. channel extend the length of the body, spaced about 1 ft. from the side sills. The platforms are supported by 6 by 3 $\frac{1}{2}$

poplar boards are covered with steel sheathing. The upper sashes of the body windows are stationary and the lower sashes raise. In the vestibule the center sash is arranged to be raised to any desired height, the other two being stationary.

The interiors of the cars are finished in cherry, with ceilings of agasote, which is used also beneath the windows on the inside. The 8 transverse slat seats and 4 longitudinal corner seats of the same type also are finished in cherry, and provide seating accommodation for 28 passengers.



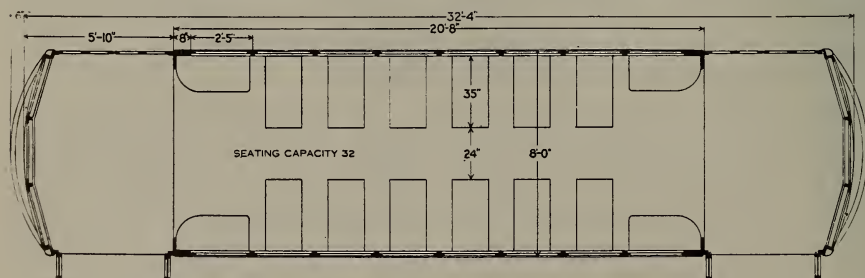
SEMI-CONVERTIBLE TYPE FOR THE LONG ISLAND RAILROAD

BRILL 21-E TRUCK

THE Long Island Railroad Company, of New York, has purchased from The J. G. Brill Company, for use on the lines of the Nassau County Railway Company, which is owned and controlled by the Long Island Company, equipment of the 20 ft. 8-in. semi-convertible type. The Nassau County Company, which operates a short section of the lines of the

Long Island, purchases power from Far Rockaway, and has its offices at Sea Cliff, L. I.

The length of this type of car over the corner posts is 20 ft. 8 in.; length of each vestibule from end of car body to outside of vestibule sheathing, 5 ft. 10 in.; length of body over platforms or vestibules 32 ft. 4 in.; length over bumpers 33 ft. 4 in.; width over sheathing,



SEMI-CONVERTIBLE TYPE. The body without electrical equipment weighs 5,600lb.; length over vestibules, 32 ft. 4 in.; length over bumpers, 33 ft. 4 in.; rail to trolley board, 11 ft. 2½ in.; rail to floor, 3 ft. 1½ in.



SEMI-CONVERTIBLE TYPE. The inside of the car is finished in cherry. Brill "Winner" seats are used, arranged, with the longitudinal seats, so as to give the car a seating capacity of 32 persons

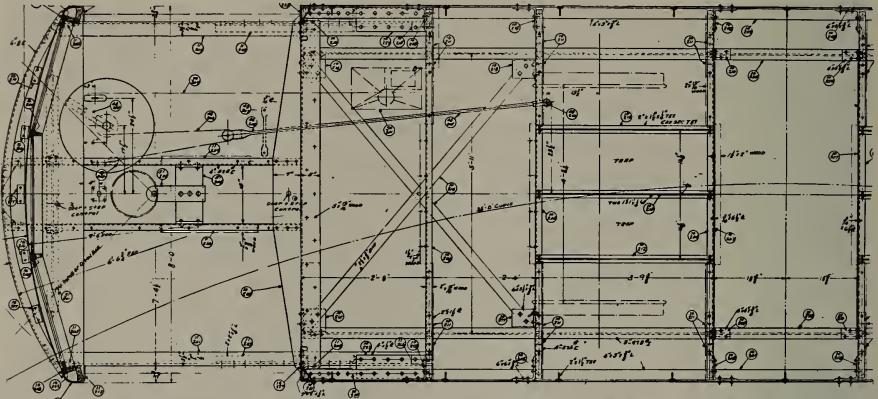
8 ft.; width over posts, 7 ft. 11 13/16 in.; center to center of side posts, 2 ft. 5 in.; height from rail to floor, 3 ft. 11 1/4 in.; height from rail over trolley board, 11 ft 2 1/4 in.

The windows, of which there are eight on each side, are of the Brill semi-convertible tandem sash arrangement, with metal sash stiles. Both sash raise into the roof, the lower one being hinged to the upper one.

The vestibules are of the stationary round-end type, sheathed on the outside below the windows with sheet steel sheathing and on the inside with the same material. Each of the vestibule fronts is pro-

vided with three windows with single sash arranged to drop, the center sash being provided with a rack to hold it at various heights. Each of the step openings is provided with folding doors in two sections, one section folding out against the body corner posts and the other section folding out against the vestibule corner posts. The doors are arranged to operate in conjunction with the folding steps.

The floor is of 13/16-in. narrow yellow pine boards covered with maple tapered floor mat strips. The roof is of the plain arched type, extending the full length of the car and strengthened with con-



SEMI-CONVERTIBLE TYPE. The car collects its current by means of a pantograph placed on the roof, which is designed to support the pantograph, a weight of 430 lb.

cealed steel rafters of pressed steel U-shape, the center of the roof being reinforced to take care of a pantograph trolley weighing about 430 pounds. The roof boards are of poplar.

The corner posts are of angle and the side posts of $1\frac{1}{2}$ by 2 by $\frac{3}{16}$ -in. tees. The side sheathing is made of $\frac{3}{32}$ -in. sheet steel, extending from the bottom of the side sill to the top of the belt rail and reinforced at the bottom with 4 by 3 by $\frac{1}{4}$ -in. angle and at the top by 3 by $\frac{1}{2}$ -in. plate.

In the underframe the side sills are of 4 by 3 by $\frac{3}{8}$ -in. angle. The end sills are of $\frac{3}{16}$ -in. pressed steel plate pressed Z-shape. The diagonal braces are of $2\frac{1}{2}$ by $\frac{3}{8}$ -in. bar and the crossings are of 4-in., 5.25-lb. channel. The framing for the trap door is made of 2 by $1\frac{1}{2}$ by $\frac{1}{4}$ -in. tees. In the platform the

outside knees are of 7 by $3\frac{1}{2}$ by $\frac{1}{2}$ -in. angle and the center knees of 4-in., 5.25-lb. channel. The wheel pieces are made of 5-in., 9.75-lb. I-beams. The bumpers are of 6-in., 8-lb. channel.

The inside of this type of car is finished in cherry, including all doors, linings and mouldings. Brill "Winner" transverse seats are used, six on each side. The aisle is 24 in. wide and the seats 35 in. in length. At each corner of the car there is placed a longitudinal seat to accommodate two persons each, the seats occupying the space of one window each, thus giving the car a total seating capacity of 32 persons.

The car is mounted on a Brill 21-E truck with an 8-ft. wheelbase and with 33-in. wheels. The weight, without electrical equipment, is 5,600 lb.

A practical method of carrying the lightly-loaded carbody on soft-acting coil springs is a standard feature of all Brill double-trucks for city service.

AUTO OMNIBUSES FOR PLYMOUTH, PA.

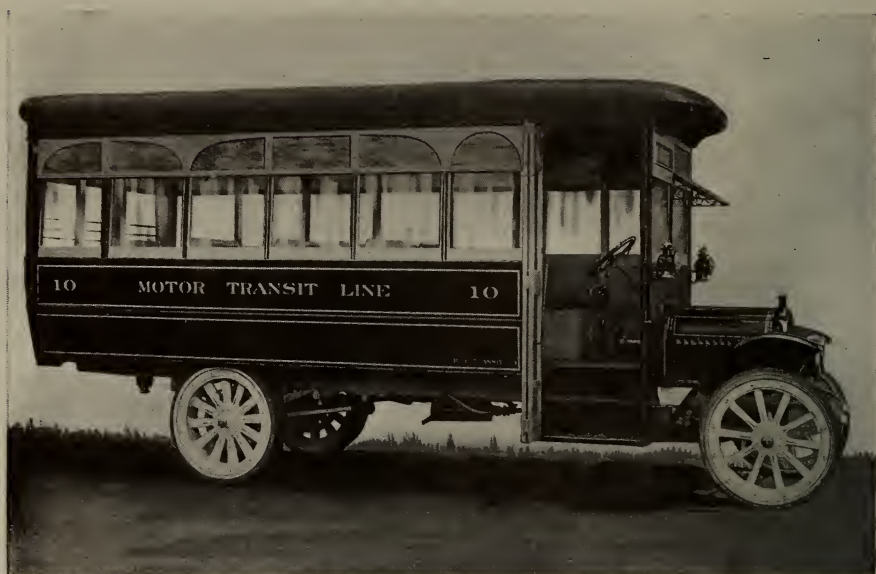
LIGHT WEIGHT A FEATURE

THE J. G. Brill Company has delivered to Frank M. Martz, of Plymouth, Pa., two auto omnibuses, one having a seating capacity of 22 and the other of 12 persons. These buses are for use between Wilkes-Barre, Plymouth, Avondale, Nanticoke, Pittston and Inkerman, towns which are not very widely separated but, being located in the mining region, in the heart of the mountains, subject vehicles which ply between them to very severe service. The larger of the two buses has been put into operation and its performance has more than pleased the purchaser. It is in use from six o'clock in the morning until one o'clock the next morning and is therefore called upon for the most exacting kind of hard and continuous service. That the body is right in construction is attested by the purchaser, who reports that he is using a smaller quantity of gasoline for a uniform service than that upon which he

ever has been able to operate before. This advantage has been given the car through the construction of the body, the weight having been reduced to the lowest possible point to be productive of the strength and ruggedness necessary for travel over the roads and grades encountered, the body and chassis weighing well under 7,000 lb. The purchaser reports better results



AUTO BUSES FOR PLYMOUTH. The emergency door is shown, located at the rear window. This is one of the features of the buses, as heretofore the emergency door has been placed in the center of the rear of the bus



AUTO BUSES FOR PLYMOUTH. Exterior of the larger bus. This bus has a seating capacity of 22 persons

than those obtained with any other body he has ever used, mounted on the same kind of chassis.

One of the most unusual and interesting features of the buses is the safety exit arrangement. Heretofore the emergency door has been placed in the center of the rear of the car, making it necessary to remove a seat to obtain egress from the rear of the bus. On these new buses, however, the door was placed on the right hand side of the bus at the last window, reaching from the guard rail to the letter panel. Thus the door does not weaken the bus, as it does not extend down through the guard rail.

The whole bus is made to stand up under hard service and at the same time to produce economy of operation, the obtaining of which object has been proved so conclus-

ively in its road tests under actual service. The underframing of the body is of oak, the crossings being tenoned into the side sills and made firm with malleable iron brackets bolted to the sills and to the crossings.

The entrance is at the right hand forward corner of the bus, there being two stationary steps and a folding door with two leaves. The driver is seated on the left side of the car, his seat being placed so in relation with the half-seat across the aisle that it is convenient for him to collect the fares from incoming passengers. On the right hand side of the large bus there are placed five windows and the two doors, entrance and emergency, and on the left side there are seven windows. Across the rear of the bus there is a transverse seat. This



AUTO BUSES FOR PLYMOUTH. Exterior of the smaller bus. This bus will accommodate 12 persons seated

rear seat will accommodate five persons and, including the single seat placed opposite the driver's seat, the bus will take care of 22 passengers, seated.

The larger bus is mounted on a White $1\frac{1}{2}$ ton chassis, with a wheelbase of $157\frac{1}{2}$ in. and 36 in. wheels. Its width over the side sills, including the sheathing, is 6 ft. 7 in.; width over posts at belt, 6 ft. 10 in.; extreme width, 6 ft. $10\frac{3}{8}$ in.; width of aisle, 15 in.; height from underside of side sills over roof, 6 ft. 10 in.; height from floor to center of carline, 6 ft. 6 in.; height of steps, 9 in.

The interior of the buses is finished in clear ash. Directly behind the driver's seat there is a curtain which may be stretched up to the ceiling and fastened, thus cutting off from the window in

front of the driver at night any reflection of lights in the interior of the car.

The corner posts of the body are of ash and the side posts are also of ash, $1\frac{3}{8}$ in. thick, with a sweep of 2 in. The side sheathing is of sheet steel and the side sills, end sills and crossings of tough white oak. The plain arch roof extends the full length of the car and is supported on carlines.

The construction of the smaller bus in general is similar to that of the larger bus, it being the object of the builders in each case to combine light weight with great strength. This bus was mounted on a White chassis weighing 2,852 lb. and the total weight of the body and chassis was but 4,700 lb. The wheelbase of this chassis was $133\frac{1}{2}$ in. with 34-in. wheels.

The body of the smaller car measures 2 ft. 3 in. between centers of side posts; width over sills including sheathing, 5 ft. $4\frac{5}{8}$ in.; width over posts at belt, 5 ft. 8 in.; extreme width, 5 ft. $8\frac{3}{8}$ in.; width of aisle, 15 in.; height from underside of side sills over roof, 6 ft. 8 in.; height of steps, 9 in.

This bus was provided with a curved seat extending across the rear of the bus the full width of the interior, the bus having three windows and two doors on the right hand side and five windows on the left hand side. On the right side of the aisle there are three single stationary cross seats 18 in. long, while on the left side there are two double stationary cross

seats, 32 in. long, a longitudinal seat for one person being placed adjacent to the driver's seat, thus giving the bus a total seating capacity of 12 persons.

The front corner posts are of ash, 2 by $4\frac{1}{2}$ in., cut to shape, and the rear corner posts are composite, $1\frac{3}{8}$ in. thick, and of ash. The intermediate posts are $1\frac{3}{4}$ in. thick, cut to pattern. The front end of the bus is provided with two windows, the bottom sash of which is arranged to be raised or lowered with the top sash stationary. The left hand top sash is provided with a stationary storm shield. In the rear of the bus there are three windows, the bottom sash raising and the lower sash being stationary.



AUTO BUSES FOR PLYMOUTH. Interior of the larger bus. The interior is finished in clear ash

The upper side top sash is made in one continuous frame with the lower side sash arranged to raise or lower.

The side posts are tenoned into the side sills and the top rails and the intermediary posts are secured to the side sills by strap bolts. The top plate is of $1\frac{1}{4}$ by 3-in. solid ash and the beltrail is also of solid ash, $1\frac{1}{8}$ by $2\frac{1}{2}$ in., boxed into the posts. The side sheathing, which is of sheet steel, is secured to the corner and intermediary posts and to the cover joints by strap irons. In the underframe the side sills are $2\frac{1}{8}$ by 4 in. and the crossings $2\frac{1}{4}$ by $4\frac{1}{4}$ in. The roof is of the plain arch type with ash earlines curved from rail to rail and with no interior ceiling.

The exhaust from the engine is

used in each case for heating the buses, two heaters being placed in the larger bus, about the middle of the bus and under the seats, and one heater being installed in the smaller bus, located on the right-hand side under the first cross seat. This effects an economy and makes for simplicity, a separate installation for generation of current for heating being unnecessary. The interiors of the buses are finished neatly and attractively, all trimmings being of bronze metal. In the smaller bus an iron pipe stanchion painted white extends from the floor to the ceiling, located next to the entrance door at the right-hand side of the car. Ventilation is given through a ventilator located in the front end of the bus.

In the Brill 74 Truck the railway field recently has been given a truck which is at once light enough for use under trailers and strong enough for use with motors. The truck is designed primarily to provide the easy-riding qualities of the Brill 21-E, but, being built without the solid-forged side frames and with a modification of the spring system, is much lighter in weight. This decrease in weight is effected by shortening the length of the extension beyond the axles, the wheelbase remaining the same. The outside body coil springs of the 21-E are done away with and the semi-elliptics are moved in toward the axles and seated on the extension of the journal boxes. By means of an additional casting which provides a seat for the semi-elliptics the journal boxes are made interchangeable, it being possible to seat the body coil spring on either extension of the box simply by removing the casting provided for the semi-elliptic. The truck possesses also the feature of swinging the car very low, carrying the body two inches lower than does any other truck except the 21-E.

THE GEAR-DRIVE SNOW SWEEPER

HISTORY OF IMPROVEMENTS

IN thirty years the growth of the railway field and its demands for efficient snow-fighting apparatus have brought about many improvements in the first equipment ever used, until today there is on the market a snow sweeper whose action is powerful, doing the work in a manner to meet all conditions, cleaning up the lines during the heaviest storms and preventing tie-ups which were inevitable heretofore. This sweeper is the bevel-gear-drive snow sweeper put on the market by The J. G. Brill Company.

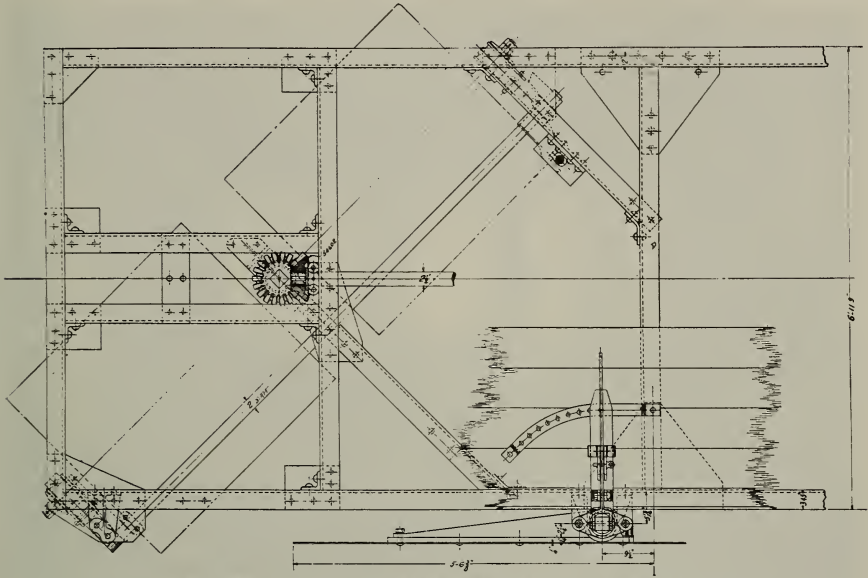
Thirty years ago the horse-car lines were equipped with a snow plow and a snow sweeper, which, light though they were and incapable of doing properly and efficiently the work for which they

were designed, embodied the real basic principles. These pieces of equipment, however, were in need of modification and improvement, and step by step they have been developed.

In the first place, there was a snow plow which was built along lines that strongly suggest the snow scrapers of today. This machine was made up of a light platform, with no covering, and mounted on four light wheels. The plow consisted of a rigid plank, which was placed under the front axle of the car at such an angle that it was in front of the left-hand front wheel and behind the right-hand front wheel. It was brought around the car so that its tail flanked the rear wheels, protecting them. However, the



GEAR-DRIVE SNOW SWEEPER. The brooms are driven by power transmitted from the broom motor by bevel gears, instead of sprockets and chains



GEAR-DRIVE SNOW SWEEPER. Changes have been made in the framing structure. The front bracket guide is hung in front of the frame from a heavy plate, and additional diagonal bracing has been used

right-hand front wheel bit into the snow just as it lay on the track, no provision being made to protect it.

The snow sweeper was light, but it had the fundamental principles, although those principles were in great need of the development that has been given them. At first the brooms with which this early sweeper was equipped were driven with power transmitted from the axles. Then a suitable type of motor was designed and they were given their energy from this motor. This gave the sweeper power for greater speed. However, as the car was driven along the streets the snow and ice and mud were thrown high into the air by the rapidly-revolving brooms; pedestrians, and even shop windows, were pelted. This showed that something was needed in the way

of improvement. The thing that answered the need was the adoption of aprons to control the flying snow. Then, realizing that a machine driving its brooms by sprockets and chains was no more efficient than the weakest link in its chain was strong and that there were too many working parts in a sprocket-and-chain sweeper, The Brill Company perfected and put on the market a sweeper whose brooms are driven by a system of gears from the motor.

This sweeper has been a success because of its greater efficiency, the reduction of the number of working parts being a great factor in its favor. From the standpoint of the operator, the railway man, who is vitally interested in the economy and, therefore, in the efficiency of the sweeper, the change from the sprocket - and - chain

method of driving the brooms to the gear-drive probably is a bigger step in the development of the sweeper than any of the other improvements. With reduction of working parts, the possibilities of the machine getting out of order through wear or breakage are reduced, and that spells efficiency.

The sweeper whose interior and exterior are shown in the accompanying illustrations is equipped with the gear-drive. The motor which drives the brooms is mounted at the center of the underframe, and power from it may be taken toward either end of the car by means of a longitudinal shaft fitted with a clutch on each side of the motor. The car is mounted on running gear with a wheel base of 6 ft. 7 in. The brooms, which are 3 ft. 4 in. in diameter, are placed at an angle of 45 degrees in front of the wheels. Power is given them from the longitudinal shaft by means of a bevel gear which meshes with a similar gear on a vertical shaft located just outside of the cab. This vertical shaft carries the power down to the broom axle, to which it is transmitted by means of another set of bevel gears.

The brooms are raised and lowered by hand. Two wheels are located in the cab, one for each broom, or at opposite corners. These wheels twist a shaft whose lower end is threaded through a lever. This lever is arranged so that its arms are 9 and 13 $\frac{1}{4}$ in., respectively, reading from the point of power application. From the power end of the lever a bar

extends down vertically to the broom, furnishing power to raise or lower. This power is also transferred to the center of the broom and to the end away from the operating lever by means of a 2-in. shaft, to which, at the center and the farther ends, there are fastened arms similar to the one at the end of the broom where the power is applied. The brooms are braced at each end and at the center by heavy bracket guides, through which a cylindrical rod is passed, thus allowing the broom movement in a vertical direction, which movement is controlled by the hoisting apparatus. At the center guide provision for raising and lowering the broom is made by allowing the power shaft to slide up and down on its key. The distance from center to center of the outside broom shaft guides measures 9 ft. 3 $\frac{1}{2}$ in. The brooms may be raised 7 in. from the tracks, and they make a sweep of about 7 in. on either side of the track.

In the underframe there are four internal cross members of 7-in. 20.9-lb. channel. The end sills are of 8-in. 23.8-lb. channel, and the side sills are of the same dimension. A 7-in. 20.9-lb. channel is placed parallel to the brooms in the panels ahead of the bolsters and fastened to the frame by heavy web plates. Two of the 7-in. 20.9-lb. channel internal cross members form the bolsters, which are placed 3 ft. 1 $\frac{1}{2}$ in. either way from the center of the car. The other two members are placed 3 ft. 11 $\frac{3}{4}$ in. in from the end sills. Additional bracing is effected in the central



GEAR-DRIVE SNOW SWEEPER. The brooms are raised and lowered by means of power from a hand wheel placed in either corner of the cab, the lower end of the wheel's rod being threaded through a lever

panel by the use of two longitudinal 7-in. 20.9-lb. channels, one placed 7½ in. from one of the side sills, and the other 1 ft. 9 in. from the other side sill.

Between the end sill and the first cross members at each end of the car there are used two 7-in. 20.9-lb. longitudinal channels, placed 11¼ in. either side of the longitudinal center of the car. At a point 1 ft. 6 in. in from the end sill there is riveted between these channels a plate 5 by 1 in., to which is fastened one of the three brackets supporting the pin coupler. The other two brackets supporting the coupler are fastened to the end sill. The front end of the broom is supported by means of a heavy plate, which is fastened be-

low the end and side sills, and to which the bracket guide is bolted.

The car measures 7 ft. over the side sills and 25 ft. 3½ in. over the end sills. At a point 9½ in. in front of the center of each bolster and on the left side of the car, facing front, there is hung a scraper wing, which is adjustable vertically and radially, being arranged so that it may be swung out from the side of the car by means of a lever moving in a groove which is notched, thereby making adjustment at almost any angle with the car possible. The wing, a ¼-in. plate 2 ft. wide and 6 ft. long, is raised and lowered by means of a lever fulcrumed within the cab and regulated on a vertical segmentary guide.

SUGGESTIVE SUBJECTS

NOTE.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

WHICH ?

I'M a trolley car conductor. From my job I get the bread and butter for my family and for myself, but still I'm discontented. I dislike my work and think of it as being with no chance of promotion in the future. I'm not satisfied with my lot, although the officials of the railway for which I work are always pointing out to me big men in the field, men who are really amounting to something, who have started just as low down the ladder as I am now. But that's all talk—there's nothing to it. Maybe they did start low down the ladder, but they didn't work themselves up—they were yanked up by "pull" from above. There is no chance for a trolley car conductor to amount to anything in this world, for the odds are too great against him. He's in a rut and there's none that will help him get out or care whether he gets out at all. And so, I feel that there is no reason why I should work any harder on my job than I absolutely have to. It wouldn't do me a bit of good. In other words, I'm disgusted with my lot—I'm a quitter.

I'M a trolley car conductor. I get my bread and butter from being a trolley car conductor and instead of being discontented and unhappy over my lot I am proud that I am able to take home every week a pay envelope large enough to pay those bread and butter bills. I'm not without push but neither am I a discontent, always figuring that someone is being shoved or pulled up the ladder of life ahead of me, taking the promotions I should have. I reason that promotions will come to me when I have earned them; power will be mine when I have learned how to use it the right way. There is lots of chance for the future in this job of mine and I intend to work toward that future hard and in earnest. The world is full of discontents and unhappy beings without push, but none of them are the men I want to copy after—the big men of the railway field. I do every day, every week, every month of the year more work than I am paid to do, realizing that some day I will get my reward—I'm a hustler, a worker.

Satisfy yourself that you are strictly on the job when the inspector boards your car; do this by being on the job all the time.

WHEN MISTAKES BECOME VIRTUES

FACE the music when something goes wrong. A quitter never got anywhere yet. And you want to get on, don't you? You realize, don't you, that there is something better always ahead of a good railway man? Study your mistakes, learn how best to avoid them and then—forget them hard. If you do that your mistakes will take on the nature of virtues, for by them you will have benefited yourself.

Remember, each fare you ring up on that old cash register is a nail in the house you are building for yourself—the house of success into which you are going to move some one of these days. Do you want that house to grow as by magic? Then drive each nail home straight and true and with a ringing blow. Hang each fare up as though you liked your work, not as though you were bored to death and could just barely keep awake. And then the nails will go home where they belong instead of bending and snarling and retarding the work of your progress.

The man with the “pull” may be taken off his run and given the big opportunity that you deserved, but what do you care? That is only human nature—that favoritism. And it won't last. Sooner or later—and more than likely sooner—you will take the place of this child of fortune and when you say goodbye to your job of fare-taking or air-braking you will say goodbye to it for good, for you will go up to take the place the man with the “pull” couldn't hold. So stick close to your knitting and look out for number one and your passengers in the same glance.

Responsibilities will come to you soon enough if you are worthy to shoulder them and power will come and plant itself at your feet if you are capable of being with power. But until they do keep plugging at the same old stand, being honest with yourself and the company whose cars you take out and considerate of the comfort of the patrons of those cars. After all, it's these patrons that make the wheels turn around, isn't it?

Always bear in mind that it is given to the company for which you work power to look into your bosom only so far as the uniform coat that covers your chest. That being the case and realizing that your character is largely judged by your reputation, why not keep that uniform coat as clean and nice as the dust of your run will permit? 'Tis little things like that—a shaven chin, clean and smiling face, and generally well-groomed appearance—that go to make up your reputation with your company. So why not give those little things some attention?

Don't be a knocker. Don't criticise the officials of the road, about whom you probably know nothing, about whose duties and capabilities you are almost entirely ignorant. Be a booster of other people and you will soon see how willing they will be to boost you.

Chewing gum may be good for the digestion—we will allow the doctors of the world to figure that out and argue over it—but it is certainly not good for promoting the opinions held of you by the patrons of the road for which you work. A wagging chin, a mouth stuffed full of gum, are vulgar and silly. If you don't care about whether or not people think of you as being vulgar, then think about how many of your company's patrons are considering you silly.

Don't think of your job on the platform as small and unimportant. Lots of men have started up the ladder from the point where you are now and they have climbed. Why not you?

PRODUCTIVENESS AND WAGE LIMITS

WHAT kind of a man is it who is repeatedly heard to say, "Oh, I guess I'm doing about as much work as I'm getting paid for, so why should I do any more?" Is it the successful man, the man on the top of the heap, who draws down the big money and gives out the big orders? Certainly not. It's the little fellow who has worked himself into a smothering rut through his own lack of ambition, his unwillingness to do more than the amount of work that exactly corresponds with the modest little sum he finds tucked away in his pay envelope every Saturday afternoon. It is his own fault that he is not the big fellow on the top of the heap. He fails to realize that that big fellow was once a little fellow, the same as he. But how did he become a big fellow? By doing exactly as much work as he was paid to do or by doing more than his wages demanded? And would he ever have become the big man if he had stayed close to his salary limit and regulated the amount of work he put out by that limit? None of us may ever hope to be paid every cent that we are worth—not if we have the slightest amount of ambition in our makeup. But what we can do to better ourselves is to do constantly more and more than we are paid for and then to drag our salary up to a pitch nearer the level of the amount of our production. There is nothing of the old help-your-fellowman stuff in this preachment; it's simply a case of selfishness, this desire to boost ourselves up the ladder of life. But it's a selfishness that is pardonable—laudable—for it helps us, it helps those who are dependent upon us, and, last of all, it helps the railway for which we work, or otherwise that railway wouldn't pay us more money.

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BRILL AUTO-OMNIBUS BODIES

IN view of the probable future need of American street railway companies to supplement their business with auto-omnibuses, both as developers and feeders to their systems, The J. G. Brill Company, many years ago, took up the task of evolving and standardizing suitable bodies, and has furnished a considerable number to railway companies. It is plain that this class of construction belongs more to the trolley car building art than to that of carriage and coach building, both on account of the severity of operating conditions, requiring the extra-sturdy construction familiar to trolley car builders, and because many transportation factors are identical with street railway operation, calling for a close adaptation of trolley car door and step arrangement, seating plans, window features, etc. The present and future demand for these bodies, whether from street railway companies or other companies, will obviously be met either by trolley car builders or carriage builders, and, since the design and construction is more analogous to trolley car building, The J. G. Brill Company, with its broad experience in auto-bus body building, must inevitably continue its leadership in this field.

THE J. G. BRILL COMPANY, PHILADELPHIA

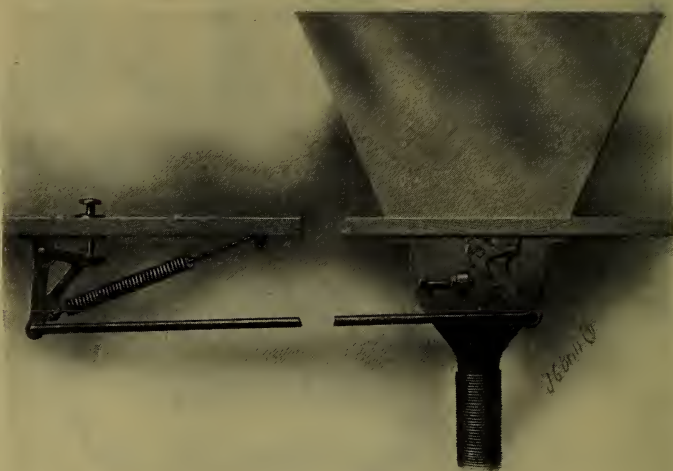
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BRILL "DUMPLIT" SAND BOX

(PATENTED)

THIS box, by reason of its continued satisfactory service, guaranteed by its simple and rugged construction, its ease of operation and its all-around reliability, has become standard on hundreds of lines, and during the last thirteen years it has stood up against the keenest kind of competition and the demand for it has not weakened. With its double hopper, it does away with the possibility of the sand becoming wet and clogged in the box, because any water which may follow a sand wick up the hose from the rail cannot reach the sand. Thus the box always supplies dry sand when it is needed for stopping, starting and accelerating on slippery rails. It may be operated with a treadle as shown, or may be equipped with a lever if desired.



Charles L. Henry

PRESIDENT, AMERICAN ELECTRIC RAILWAY ASSOCIATION
PRESIDENT AND GENERAL MANAGER INDIANAPOLIS & CINCINNATI TRACTION COMPANY

NOVEMBER 15, 1915

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CHARLES L. HENRY

CHARLES L. HENRY, President and General Manager of the Indianapolis and Cincinnati Traction Company and newly-elected President of the American Electric Railway Association, was born on a farm in Hancock County, Indiana, near Greenfield, July 1, 1849. Although his education was along legal lines, Mr. Henry has shown keen judgment in engineering matters. He was graduated from the law school of Indiana University in 1872 and practised law in Pendleton, Indiana, and Anderson, Indiana, serving for four years in the Indiana State Senate and subsequently being elected for two terms as a Representative in Congress. In 1891 he became actively connected with the street railway industry, his first venture being the purchase of the horse car line in Anderson, which line he electrified shortly afterward. All of Mr. Henry's activities during his long and successful career have been centered in or about Indiana, his native state, but his every instinct is that of the pioneer who seeks to avoid the beaten trails. For twenty-five years he has been a leading figure in the development of the extensive system of interurban lines radiating in all directions from Indianapolis, the success of which exercised a tremendous influence in encouraging the construction of long electric interurban lines elsewhere. He is credited with having originated the term "interurban railway," which was coined and applied to the new lines at Indianapolis soon after their operation began. This venture, it may be said, was the beginning of the now famous Union Traction Company of Indiana, which was formed in 1899 to combine the several electric railways that had sprung into being following the success of Mr. Henry's pioneer line from Anderson to Alexandria. Subsequently, as General Manager of this company, Mr. Henry constructed the lines from Muncie to Indianapolis, forming the backbone of the system as it exists today. Several years ago, however, he disposed of his interest in the company to form the Indianapolis & Cincinnati Traction Company, notable as one of the earliest successful single-phase systems in the country, as well as for a number of innovations along technical lines that have been brought to perfection through their adoption by the railway of which Mr. Henry is now the head.

INTERURBAN CENTERS AND INTERURBAN CARS

BUFFALO

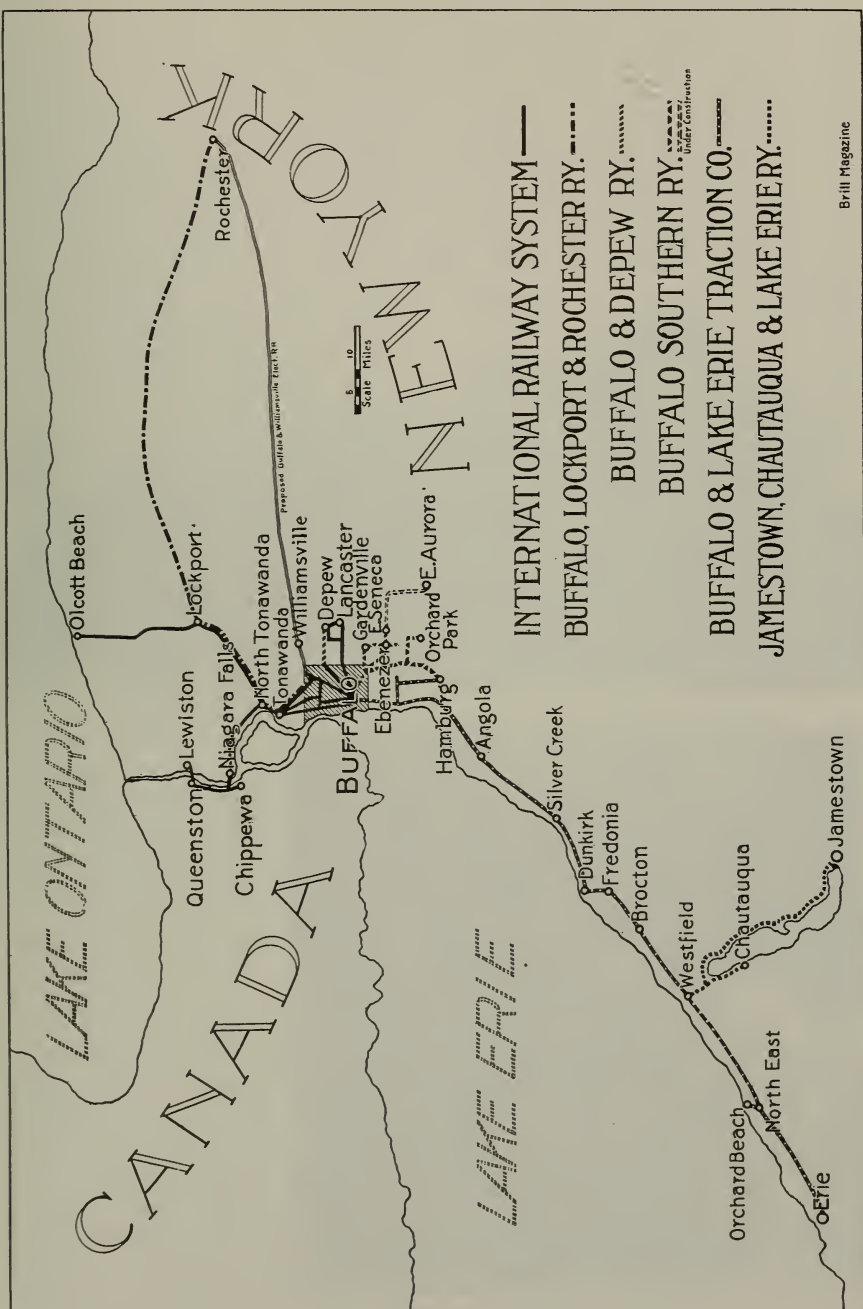
BUFFALO, New York's second largest city, is located on the east shore of Lake Erie and the east bank of the Niagara River, about twenty miles south of Niagara Falls. Situated about midway between New York, Boston and Chicago and forming the eastern terminus of a tremendous marine traffic on the Great Lakes, it naturally has grown into one of the great traffic and industrial centers of the United States. Fifteen steam railroads reach the city and bring to it thousands of people, many of them tourists en route to Niagara Falls, and millions of tons of commerce, for the handling of which the city has more than 500 miles of steam railroad tracks. The harbor is one of the finest in the country and, in addition to its domestic commerce, it plays a large part as a Canadian frontier port, with exports amounting to \$26,192,563 in 1908.

The country about Buffalo is for the most part rich farming land, where truck gardening and the growing of grapes have become such large industries as to cause the interurban systems operating through these districts and into Buffalo to rank among the largest in the country. From Buffalo interurban lines run along the Niagara River to Niagara Falls and the attractions of the trip, with its beautiful scenery, cause hordes of tourists to patronize the electric

line on their way to the Falls. To the south and west an interurban system extends to Erie, passing through the wonderful Chautauqua Grape Belt with its productive farms, gardens and vineyards and its busy wine- and grape juice-making industries. This section of the country is densely populated, and the business done by the interurban lines is very large, the handling of fast freight and package express playing a large part.

From Erie interurban connection may be made with points in Ohio, including Cleveland, Detroit, Columbus, Cincinnati and even Chicago in Illinois. To the east from Buffalo connection is possible with lines into Rochester, and from there further into the eastern section of the state. As a manufacturing city Buffalo is surpassed, in the state, only by New York, the factory value of its products in 1905 being \$147,377,873. Meats, refined oil, soap, candles, malt liquors, flour, lumber and commercial steel and iron form its chief products, the making of machinery being also an important item. This volume of manufactory creates necessity for transportation both to and from the city and, although the city has so many steam railroads, the electric interurban lines also enjoy the advantage of taking care of part of this demand for traffic facilities.

The International Railway Company is a consolidation into one



operative company of all the street railways in Buffalo, Lockport, Niagara Falls, Tonawanda, North Tonawanda and vicinity. The company is the result of the consolidation in 1902 of the Buffalo City Railways and the following interurban companies: Buffalo & Niagara Falls Railway, Buffalo & Lockport Railway, Buffalo, Bellevue & Lancaster Railway, Elmwood Avenue & Tonawanda Railway, Lockport & Olcott Railway, and the Niagara Falls, Park & River Railway.

From Buffalo the Buffalo & Niagara Falls Railway runs north through Tonawanda and North Tonawanda, turning west and following the bank of the Niagara River to Niagara Falls. From Niagara Falls the Canadian, Chippewa & Queenston (Park & River

Division) runs from the Canadian Niagara Falls south along the Ontario shore of the Niagara River to Chippewa and north to Queenston, directly opposite Lewiston. At Niagara Falls, Ont., transfer connections are made with the Niagara, St. Catharines & Toronto Railway Company and during the summer season the cars of the latter company are operated by agreement through Niagara Falls, Ont., to Niagara Falls, N. Y., over the International tracks.

The Buffalo, Lockport & Olcott Division runs from Buffalo northward through Tonawanda and North Tonawanda, Pendleton, Lockport, Wrights, Corwins, Newfane and Burt, and terminates at Olcott Beach, on the shore of Lake Ontario, about fifteen miles east of Youngstown, which is at the mouth of the Niagara River.

At Lockport connection is made with the tracks of the Buffalo, Lockport & Rochester Railway and by traffic agreement the latter company operates its cars over the tracks of the International into the city of Buffalo.

The Buffalo, Kenmore & Tonawanda Railway starts from a point south of the business section of Buffalo and, passing through that district, runs out through Kenmore, a suburb, and from there to



INTERURBAN CENTERS AND CARS. Intersection of Main and Niagara Streets, Buffalo



INTERURBAN CENTERS AND CARS. Gratick car house on the Buffalo and Niagara Falls Division of the International, showing the approach to the Gratick trestle over the New York Central Railroad

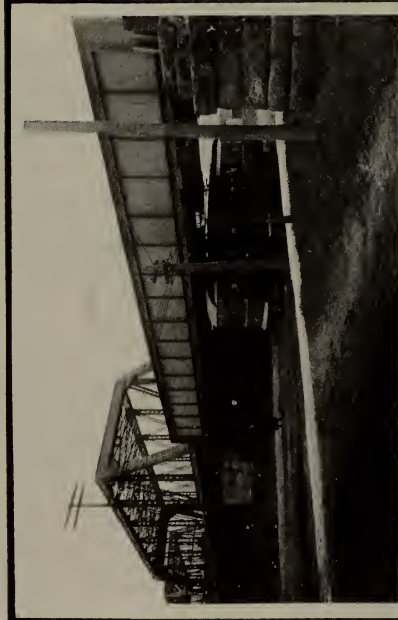
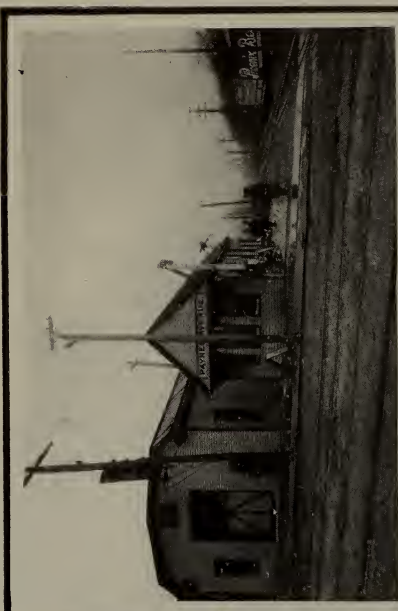
Tonawanda and North Tonawanda.

The Buffalo, Bellevue and Lancaster Division operates from the business center of Buffalo eastward to the villages of Bellevue, Lancaster and Depew, making a loop through Lancaster.

The lines of the International have a total trackage of about 400 miles and serve districts whose total tributary population is about 700,000, the combined populations of the terminal cities of Buffalo, Lockport, the two Niagara Falls, and the two Tonawanda's being about 550,000. With the exception of the Canadian division of the system, which is supplied with current generated at a 2500 kw. station operated by the company at

Niagara Falls, Ont., the interurban lines are driven with purchased Niagara Falls power. The transmission voltage is 22,000 and the line voltage 575, there being four substations, located at Oleott Beach, North Tonawanda, Lockport and Niagara Falls, N. Y.

The standard cars operated by the company have a length over vestibules of 34 ft. and a width over side sheathing of 8 ft. 5 in. with a seating capacity of 48 persons, and weigh 29½ tons fully equipped. They are designed for double-end operation and are built on wooden underframes. Fare collection is effected by the sale of tickets, both on the trains and at agencies in the terminal cities. The



INTERNATIONAL RAILWAY COMPANY

Junction of Divisions in North Tonawanda
Upper Steel Arch Bridge, Niagara Falls, Ont.

Overhead Crossing in North Tonawanda
Queenston-Lewiston Bridge from Queenston, Ont.



INTERURBAN CENTERS AND CARS. Central power station in Buffalo. Steam plant used for standby service and peak-load hours

cars are operated singly on the Buffalo & Niagara Falls, Park & River, and Buffalo, Kenmore & Tonawanda Divisions, while on the Buffalo, Bellevue & Lancaster a trailer occasionally is used. On the Buffalo, Lockport & Olcott the cars are run in two- and three-car trains with multiple unit control.

The latter division is the only line on which freight is handled. This is done by means of standard steam freight cars drawn by electric locomotives, the freight cars being received from and delivered to the Erie Railroad at North Tonawanda and from North Tonawanda to Olcott carload freight is picked up and delivered, along with ordinary way freight. In addition to this service the company operates a fast freight service between Buffalo and all the stations on the division, using specially designed cars for

the service, the character of the freight handled being in the main produce and fruit. Wells-Fargo Express business is handled on the same division, in fast freight cars, and between Olcott and Buffalo a special express service called the "fruit express," is furnished from approximately the first of July until the middle of October; this on account of heavy shipments of fruit and produce from stations north of Lockport. Delivery is made direct by wagons to the commission merchants in Buffalo. The cars are operated in trains, one motor pulling five trailer box cars.

The statistics of the company for the year ending June 30, 1915, show that on the Park & River Division, 1,451,693 passengers were carried with a total car mileage of 295,048; on the Buffalo, Bellevue and Lancaster 1,572,540 passengers were

carried with a mileage of 289,159; on the Buffalo, Lockport & Olcott 2,126,451 passengers were carried with a mileage of 1,093,885; on the Buffalo & Niagara Falls 3,221,857 passengers were carried with a mileage of 1,126,160; and on the Buffalo, Kenmore & Tonawanda 551,319 passengers were carried with a mileage of 183,106. The figures also show that 255,103 tons

Rochester during the rush hours of the afternoon, the extra cars running as far as Brockport, seventeen miles from Rochester. Including the populations of Rochester and Lockport the lines of the company pass through a district with a total population of 285,818. Beside the connection the company makes with the lines of the International in Buffalo, connection also is made



INTERURBAN CENTERS AND CARS. Terminal station at Niagara Falls, N.Y.

of freight and 5,432 tons of express matter were carried.

The Buffalo, Lockport and Rochester Railway Company operates between Rochester and Buffalo, running its cars from Rochester to Lockport, a distance of fifty-eight miles, on its own tracks, the cars being taken over and operated by the International Railway at the Lockport city line. The company maintains an hourly schedule, putting in three half-hour cars out of

with the Empire United Railways, Inc., the New York State Railways and the B. R. & P. Ry. in Rochester. The towns served by the lines of the company pass through Spencerport, Brockport, Holley, Hulberton, Albion, Knowlesville, Medina, Middleport and Gasport.

The company purchases its power from the Niagara, Lockport & Ontario Power Company, of Buffalo, the transmission voltage being 60,000 and the line voltage 600. Sub-

stations are located about every ten miles, at South Greece, Brockport, Albion, Medina and Gasport. The cars in use by the company measure 50 ft. 2 in. over the vestibules, 51 ft. 8 in. over the bumpers, 8 ft. 3¼ in. over the side sheathing, have composite underframes, a seating capacity of 49 persons and four 75 hp. motors and weigh 70,500 lb. fully equipped, the body

also handles regular Wells Fargo Express. Ten passenger cars are in use normally, but the company has a total of twenty passenger cars available for use. The line is built on private right of way outside of the cities and a maximum speed of 50 m.p.h. is attained. The traffic statistics for last year show a total of 2,033,749 passengers carried, with a car mileage of 1,-



INTERURBAN CENTERS AND CARS. Station at Olcott Beach, N.Y.

alone weighing 30,000 lb. The cars are equipped for double-end operation, although they are operated single-end. They are run singly in normal operation, but on holidays and under heavy traffic they are run in two- and three-car trains. The freight business of the company consists of through and local freight in less carload lots and of carload lots between Lockport and Rochester and to points on the B. R. & P. The company

474,750, and a total of 4,616 tons of freight handled.

The Buffalo and Lake Erie Traction Company runs from Buffalo west to Erie, following the shore line of Lake Erie for a distance of about ninety miles. The country over which the lines of the company are spread is old and populous, having been settled for a great many years. It boasts of miles of good farms and of many prosperous farmers and it is the patron-



INTERURBAN CENTERS AND CARS. 35-ton electric engine used for hauling standard steam railroad equipment

age of these farmers upon which the company depends to a great extent. A package service is part of the system and the farmers and the merchants with whom they market their products find the frequent schedules of the company of great advantage to them in dealing with each other. Also, the demand on the part of the wives of these same farmers for traffic facilities to take them to the nearest towns and to carry their children back and forth to school is a very considerable item.

Beside the patronage from the rural districts through which the lines of the system pass the company depends upon dozens of large-sized towns and smaller villages

served by the road, all of these towns thriving, energetic communities and some of them the homes of large manufacturing plants.

The cars have their terminus at Lafayette Square in Buffalo. From Buffalo they run south to West Seneca, where connection is made with a branch running to Blasdell and Hamburg. From West Seneca the cars follow the shore line of the lake, passing the Lackawanna Steel Company's plant, which is twenty minutes run from Buffalo, and running on private right of way practically all the way to Dunkirk, which is on Lake Erie almost midway between Buffalo and Erie. This part of the route takes in the summer resort shore of the lake and

many beautiful suburban homes are passed. The line makes these homes very easy of access from the city and the way in which the number of houses is increasing shows the patronage which the company enjoys from that source. Bay View, Athol Springs, Locksley Park, Hamburg-on-the-Lake, Clover Bank, Wanakah, Weyer, Lake View, Idlewood, North Evans, Derby and other summer resorts along the shore indicate by their increasing size the effect which the

Dunkirk is a thriving, energetic place of about 20,000 inhabitants. It has five railroads and a large number of manufacturing establishments, being the home of one of the branches of the American Locomotive Works. From Dunkirk a branch line runs to Point Gratiot, a summer resort on the shore of the lake. Three miles west of Dunkirk is the village of Fredonia, famous as a center for attractive houses and the location of one of the best normal schools in the



INTERURBAN CENTERS AND CARS. Motor and trailer box cars used for "fruit express" service

service of the Buffalo and Lake Erie is having upon their popularity.

Before reaching Dunkirk, Angola is passed, and between this town and Dunkirk the country becomes more and more beautiful. The slope to the lake widens and the hills begin to loom in the background. The cars pass through Farnham, near which the soldiers of the Buffalo regiments go into camp every summer, and Irving, where the Indian reservation is located, Silver Creek and Sheridan, which feeds the big canning factories in its neighborhood from the produce of its many truck gardens.

The lines of the company pass through the famous Chautauqua Grape Belt, where the lands from the slopes of the hills in the background to the very shore of the lake are covered with vineyards. Millions of pounds of grapes are grown in this section every year and millions of baskets of the finest of the fruit are shipped to the markets throughout the country. Wines and grape juice also are manufactured.

At Westfield the tourist may transfer to the Jamestown, Chautauqua and Lake Erie Railway for Mayville, Chautauqua Lake and all its interesting points, and for Jamestown, the latter being a city



BUFFALO & LAKE ERIE TRACTION COMPANY
 Waiting-room and Ticket Office at Buffalo
 Sub-station Building at Silver Creek, N.Y.
 Bridge over Ravine, State Line, N.Y.
 Typical Stretch of Single Track



INTERURBAN CENTERS AND CARS. Typical passenger car of the Buffalo, Lockport & Rochester Railway

of 30,000, which is the center of a large furniture manufacturing business. From Westfield the Buffalo and Lake Erie lines pass through Ripley, State Line, North East, Orchard Beach, Harbor Creek and Wesleyville and thence into Erie, whose population is 80,000. There the terminus is Post-office Park. From this park con

nections may be made for the health resort of Cambridge Springs, Pa., or Conneaut, Ohio, where connection is possible with the extensive interurban systems of Ohio, by which Cleveland, Columbus, Pittsburgh, Cincinnati, Toledo and even Detroit and Chicago may be reached.

The company has affiliated with



INTERURBAN CENTERS AND CARS. Freight and express car used on the lines of the Buffalo, Lockport & Rochester



INTERURBAN CENTERS AND CARS. Union Station at Rochester

it the Buffalo and Lackawanna Traction Company, Erie Electric Motor Company, Dunkirk Street Railway Company and the Erie and Suburban Railway Company. It operates all together 185 miles of track, of which 104 miles are single track. These lines are operated under 650 volts, the transmission lines being built for 60,000 volts. There are seven substations on the company's lines located at Athol Springs, Angola, Silver Creek, Dunkirk, West Portland and State Line, N. Y., and Wesleyville, Pa. The cars which the company operates on its interurban lines have composite under-

frames and measure 58 ft. over the vestibules, with a width over side sheathing of 8 ft. 6 in. They have a seating capacity of 54 passengers and weigh, with motors and trucks fully equipped, 80,340 lb., the car body weighing 34,000 lb. The cars are designed for

double-end operation, current is collected by a trolley and the cars are equipped with multiple unit control. In normal operation the company uses 13 interurban cars and has a total of 23 cars available for use. The traffic statistics for the year 1914 show a total of 17,187,587 passengers carried, with a car mileage of 4,637,233 and a total of 15,536 tons of freight hauled.

The Buffalo Southern Railway Company operates three short lines out of Buffalo, one running to East Seneca, another to Garden-ville, both east of Buffalo, and a third to Hamburg, south of Buffalo, with a branch of the latter di-

vision running to Orchard Park. In addition the company has under consideration the extension of the East Seneca Division to East Aurora, a distance of eight miles. Half of this extension, which passes through Elma, was graded a number of years ago but never



INTERURBAN CENTERS AND CARS. General offices, storage and repair house

completed. All three of the divisions connect with the International Railway at City Line on Seneca Street, Buffalo; the cars from and to Hamburg, however, running to Main and Clinton Streets over the tracks of the International and by way of Seneca and Swan Streets.

The company gets its power from its own plants, having a steam plant located at Orchard Park Junction and a natural gas plant at Ebenezer, the current being fed into the lines at 550 volts. The lines of the company reach three parks, which makes for added traffic in the summer season. These parks are the Gardenville Park, Lein's Park in Buffalo and the Erie County Fair Grounds at Hamburg. Altogether it operates about twenty-six miles of track and uses under normal conditions a total of nine cars to carry out its schedules. Among its equipment the company has six Brill Semi-Convertible cars with a seating capacity of 44 persons each.

The Buffalo and Depew Railway Company operates fourteen miles of track, connecting Buffalo, Depew and Lancaster, the latter two adjacent towns to the east of Buffalo. The energy which the com-



INTERURBAN CENTERS AND CARS. Typical sub-station

pany uses is purchased from the Niagara and Erie Power Company, being fed to the trolleys at 550 volts. The lines of the company reach Genesee Park, a private park which aids in increasing the demand for traffic facilities, especially during the summer, when the people seeking relief from the heat of the city add to the throngs of pleasure seekers. The company has been granted a franchise from Depew to Bowmansville, a distance of two miles, and from Depew to the N. Y. C. station at Lancaster, a distance of one-half mile. For the operation of its lines the company has in service five motor and two other cars.



INTERURBAN CENTERS AND CARS. Typical passenger station, located at Spencerport



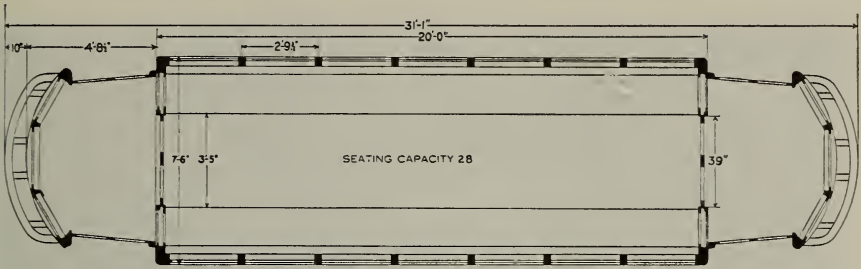
SINGLE-TRUCK CARS FOR MONONGAHELA VALLEY

BRILL 21-E TRUCK

FACED with the problem of economically operating a schedule with a fifteen minute headway over seventeen miles of track in a city of but 18,000 population, the Monongahela Valley Traction Company, of Fairmont, W. Va., has found its solution in the installation of single-truck cars and to supplement its light-weight equipment the company has purchased from The J. G. Brill Company for use on its urban lines in Clarksburg, W. Va., one of its interurban terminals, three 20-ft. semi-convertible cars mounted on Brill 21-E trucks with a 7 ft. wheel-base. The equipment was purchased with the idea of making economically practicable the installation of added service, the company, along with many others, having found that the light equipment makes possible frequent schedules at low cost of operation.

The interurban lines of the company feed on a district which is rich in industries using natural gas, the country tapped by the lines being full of coal and oil mines and natural gas. The interurban lines extend from Fairmont northwest to Fairview and from Fairmont west to Mannington, the main line running south from Fairmont to Clarksburg. From the latter city a line runs south to Weston, passing through a region thickly dotted with mines and making, through transportation of laborers, a good demand for traffic facilities. Also from Clarksburg a line runs east to Bridgeport, passing the baseball park and fair grounds. On the interurban lines the company operates, on an hourly schedule, forty-four cars, the majority of which are of the double-truck type.

In the underframes of the new cars the side sills, of yellow pine,



SINGLE-TRUCK CARS FOR MONONGAHELA VALLEY. Height from track to underside of side sills, 28 $\frac{3}{8}$ in.; height from underside of side sills over trolley boards, 8 ft. 8 $\frac{1}{2}$ in.; height from floor to center of headlining, 7 ft. 10 $\frac{1}{4}$ in.; height from rail to step, 15 $\frac{1}{4}$ in.; step to platform, 12 in.; platform to floor, 16 $\frac{3}{8}$ in.; weight of bodies without electrical equipment, 8,570 lb.; weight of electrical equipment, 1,078 lb.; weight of truck, 5,770 lb.; weight of motors, 3,780 lb.; total weight, 19,198 lb.

3 $\frac{3}{4}$ by 5 $\frac{3}{4}$ in., are bolted to the oak end sills, 4 $\frac{1}{2}$ by 5 $\frac{1}{2}$ in., and are reinforced at the corners by forged $\frac{1}{2}$ -in brackets of ample dimensions. There are also six crossings of oak, 3 $\frac{1}{2}$ by 4 $\frac{1}{2}$ in., fastened to the side sills by the same means as that employed to fasten the side sills to the end sills. Diagonals, 3 by 1 $\frac{1}{4}$ in., are fastened to the end sills, carried across the first crossings and fastened to the ends of the second crossings. The bumpers are of 3 $\frac{1}{2}$ by 6 by $\frac{3}{8}$ in.-angle. In the platforms there are two center knees 2 $\frac{3}{4}$ in. wide, located so that their inside edges are 6 $\frac{1}{4}$ in. either side of the longitudinal center of the car, and the platform is supported on outside knees of the same dimensions with an overall width of 4 ft. 11 $\frac{1}{2}$ in., these outside knees reinforced with 3 by 2 $\frac{1}{2}$ by $\frac{3}{8}$ -in. angles. The step knees, which are 2 $\frac{1}{2}$ in. wide, are strung diagonally between the end sills and the crown pieces. The drawbars are the Brill type, having double-acting springs (draw and recoil) on a solid shaft, which is 18 in. above the rail. The cars are provided also with inside truss rods, anchored at the end sills.

One of the most interesting features of the cars is the fact that the company specified Brill semi-convertible tandem sash window arrangement with longitudinal seats. Perhaps the greatest advantage of the tandem sash system is that, having the sash pocket overhead in between the roof boards and the headlining instead of below in the side of the car, a very considerable decrease in the thickness of the side of the car is possible, thus allowing the aisle to be made wider in a car with cross seats. Therefore, the fact that the company ordered the tandem sash arrangement installed on a longitudinal seat car shows that the other advantages to be obtained by use of the system were considered of sufficient importance to make it most desirable. These other advantages are that the absence of the lower pocket makes the car more sanitary because the chance for careless patrons to use the pockets as a place into which to throw or drop rubbish is done away with. Then, the pockets being overhead, there is no danger of water getting in between the inside and outside sheathing of the car and



SINGLE-TRUCK CARS FOR MONONGAHELA VALLEY. The interiors of the cars are finished in cherry, the seats being upholstered in rattan over springs

coming in contact with the vulnerable parts of the frame, causing rot in the post joints and sills, which rot is particularly dangerous because it does not become apparent until the strength of the car has been undermined. In the lower pocket arrangement replacement of glass is a larger item because the panes are easily broken through the pockets becoming clogged with refuse thrown into them. The tandem arrangement has also the advantage of making the windows easier to raise and lower and of converting the car in summertime so that it is given more air and is therefore more popular with the public.

The platforms, which are 4 ft. $8\frac{1}{2}$ in. long, have openings and steps at the sides, the openings 39 in. wide and enclosed with two-leaf folding doors, doubling against the body. Each platform is provided with a stationary round-end vestibule.

The roof is strengthened with concealed steel rafters. The body corner posts are of straight-grained ash $5\frac{1}{2}$ in. thick and the side posts are of the same material $3\frac{1}{4}$ in. thick, with a sweep of 6 in. The interiors are finished in cherry, including the doors, linings and mouldings, and the seats extend the full length of the cars and are upholstered in rattan over springs.

ONE-MAN CARS FOR OGDENSBURG, NEW YORK

BRILL 21-E TRUCKS

THE adaptability of the one-man car for use on the lines of small companies whose business is seriously affected by keen competition from the automobile is well exemplified by the experience of the Ogdensburg Street Railway Company, of Ogdensburg, N. Y. Four years ago the business of this company began to fall off, due largely to the popularity of the automobile. The company found that it would be necessary to curtail its expenses of operation, the cost of its power already being very low on account of

good facilities for using cheap water power. The company, therefore, realizing that the reduction in operating cost must be made by cutting down the number of motormen and conductors, purchased a year ago from The Wason Manufacturing Company, of Springfield, Mass., a one-man car. This car was tried out for a year and was found to give most excellent results. The Ogdensburg Company, therefore, has had four more single-truck cars manufactured.

The officials of the company feel that the adaptation of the one-man



ONE-MAN CARS FOR OGDENSBURG. The interiors of the cars are finished in cherry, stained mahogany. The seats are upholstered in rattan.

car to their lines has been the salvation of their company. It has cut down operating expenses and has increased public favor to such a point that the president of the road gives it as his opinion that the one-man car is the car of the future for roads such as the one at whose head he is.

Ogdensburg is a city of about 18,000 population, and the trolley line runs through the main busi-

ness section of the city, starting from the west end, which is a manufacturing district, and running through the business and store section of the city to the state hospital for the insane, a distance of about six miles. Where this line passes the business center a branch line running at a right angle extends through a residential section past a fair ground and to a cemetery, a distance of about two miles. There are two other branch lines, one leading to the Rutland Railroad station and the other to the New York Central station. The

company has found that the use of the five one-man cars with two other one-man cars made over from old cars is sufficient to take care of the traffic demands on its whole lines. When the company purchased its first one-man car it expected possible opposition and was therefore anxious to place in service a car as comfortable and inviting as possible so as to increase public



ONE-MAN CARS FOR OGDENSBURG. Excellent results given by a single one-man car purchased a year ago and tried out thoroughly, brought the company to order more equipment of the same kind.

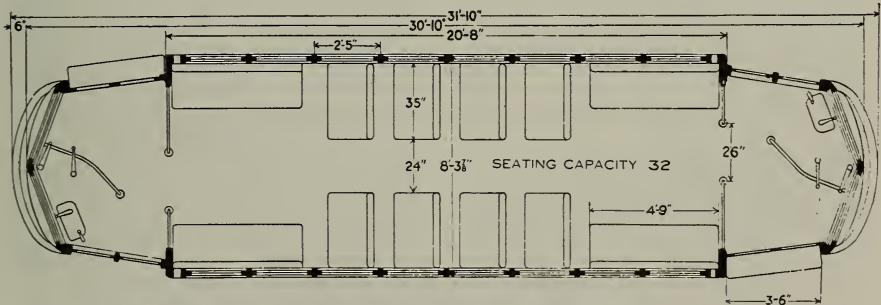
ness section of the city, starting from the west end, which is a manufacturing district, and running through the business and store section of the city to the state hospital for the insane, a distance of about six miles. Where this line passes the business center a branch line running at a right angle extends through a residential section past a fair ground and to a cemetery, a distance of about two miles. There are two other branch lines, one leading to the Rutland Railroad station and the other to the New York Central station. The

favor. The country in which Ogdensburg is located is a particularly cold one in winter, the thermometer falling as low as forty degrees, and the use of as warm a car as it was possible to obtain therefore was imperative. For that reason a double floor lined with felt and double sides lined with felt were specified. The warmth which this gave the car proved a great asset to the company, the first car built being put into use in the extremely severe service of running to the railroad depot and taking care of a short line, necessitating

considerable switching and often making it necessary for the car to take care of heavy traffic. This car stood up very well under its test, and the company found that its men preferred to operate this cheerful, warm car alone, rather than operate the old-style car with an extra man, which made it necessary for both men to stand in the cold vestibules—cold even though they were entirely closed. The company, in placing its most recent order for four cars, made in the

cause of the amount of pleasure riding that is done. The city is situated on the St. Lawrence River, at the mouth of the Oswegatchie. The Gallops—the first of the famous rapids of the St. Lawrence—begin a short distance below the city, and other points of interest and summer pleasure resorts abound in the adjacent territory, drawing people from the city.

The cars are built on an under-frame which is a combination of steel and wood. Double side sills



ONE-MAN CARS FOR OGDENBURG. Height from rail to truck sill, 26½ in.; height from rail over trolley boards, 11 ft. 6 in.; steps, rail to floor, 15¾ in., 13 in. and 9 in.; weight of carbody with body electrical equipment, but without motors, 13,400 lb.; weight of truck, 5,800 lb.; total weight without motors, 19,200 lb.

platform arrangement a few minor changes which suggested themselves to it, so that its officials now feel they have an equipment as nearly suitable to their conditions as it is possible to obtain.

An additional economical feature of the car which the company found was of importance was the reduction of the cost of "Employees' Compensation Insurance." It also found that it made for better discipline to have but one man on each car than to have a two-man crew, especially where the travel is light.

Travel in summer is heavy be-

cause of the amount of pleasure riding that is done. The city is situated on the St. Lawrence River, at the mouth of the Oswegatchie. The Gallops—the first of the famous rapids of the St. Lawrence—begin a short distance below the city, and other points of interest and summer pleasure resorts abound in the adjacent territory, drawing people from the city. The cars are built on an under-frame which is a combination of steel and wood. Double side sills of long leaf yellow pine, 4¾ by 4 in., are used, the outer member being 3 in. wide and the inner member 1¾ in. wide. The end sills are of oak, 3½ by 8½ in., reinforced on both sides by 5 by ½-in. plates. An oak crossing, 3½ by 5¼ in., bolted to an angle, 4 by 3 by ½ in., which in turn is bolted to the side sill, is used at a point 3 ft. 8¾ in. from each of the end sills. Another pair of crossings, exactly similar in construction and dimension, is used 12 in. either way from the center of the car. Angles of 6 by 3½ by ¾-in. steel extend from end sill to end sill, spaced a short

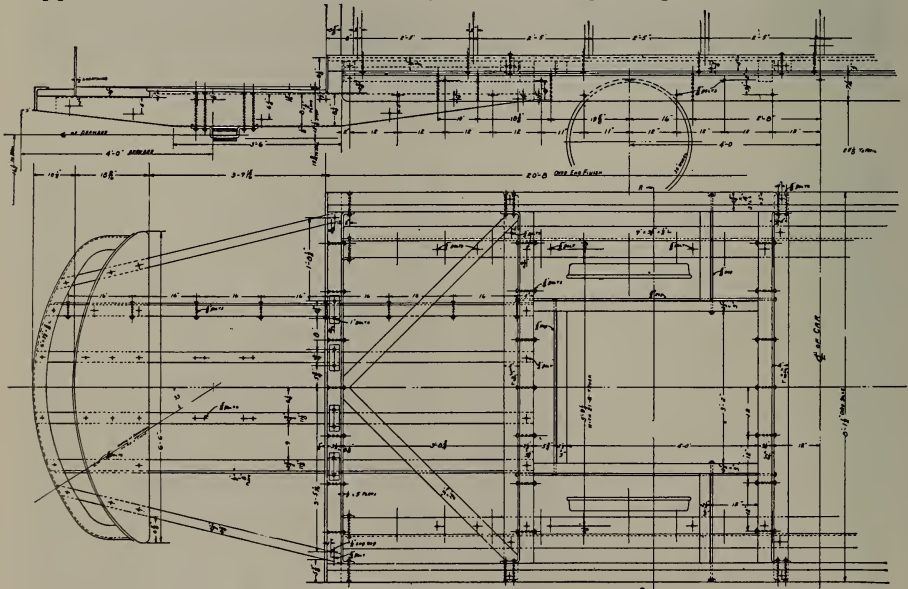
distance from the side sills on either side. The underframe is further reinforced by the use of 3 by $1\frac{1}{2}$ -in. plate diagonals at either end of the car.

The platform is supported on four $2\frac{3}{4}$ by $11\frac{1}{8}$ -in. wooden knees, the outer two having a reinforcing plate of 8 by $\frac{1}{2}$ -in. steel. These knees extend back to the first crossings inside of the end sills. The inside knees are centered on $12\frac{1}{2}$ in. and the outer members are placed 9 in. outside of these inside members. The plain arch roof is supported by body corner posts of $3\frac{5}{8}$ -in. ash and side posts of 2-in. ash placed 2 ft. 5 in. apart. The roof is also strengthened by concealed steel rafters.

There are eight windows on each side of the car, arranged so that the upper sash remains stationary

while the lower may be raised. Double folding doors are attached to the corner post on the open side and are operated by a lever at the motorman's right-hand side. The steps are so arranged that the one on the rear platform may be raised so as to prevent passengers from attempting to board the car by the rear door.

Iron pipe railings extend from the body corner posts toward the center of the car, leaving a 26-in. passageway between. A similar railing extends from the end of the vestibule near the folding door toward the corner post on the left side, forming a barrier for the motorman and a support for the fare-box. The interior of the car is finished in cherry, stained mahogany, and poplar veneer is used for the ceiling. Eight transverse seats



ONE-MAN CARS FOR OGDENBURG. In the construction of the car, particular attention was given to making the body as warm as possible, the service subjecting the equipment to severe climatic conditions.

of the Brill "Winner" type and four longitudinal corner seats are upholstered with twill-woven rat-tan and furnish accommodations

for seating 32 passengers. The cars are mounted on Brill 21-E trucks with a wheelbase of 7 ft. 6 in., and 33 in. wheels.

STORAGE BATTERY CARS FOR MIAMI

BRILL SPECIAL SINGLE TRUCK

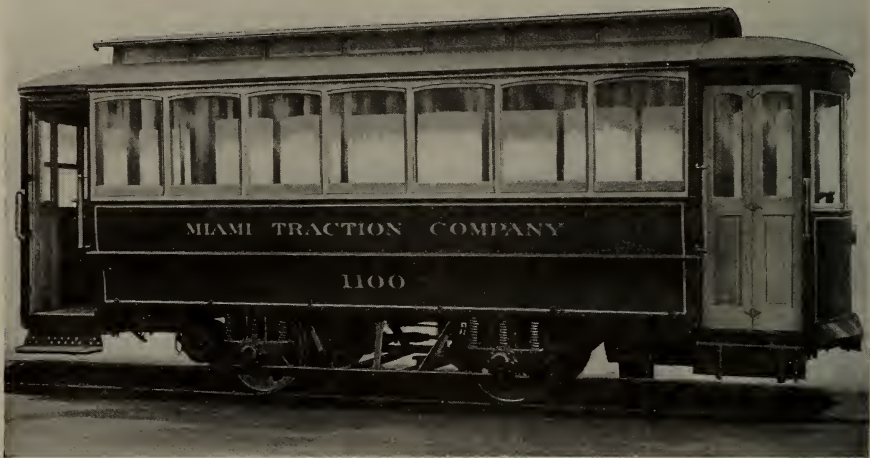
THE unlimited pleasures to be got out of a trip to Florida, with its mild climate and delightful advantages for tourists, have brought practically the whole state to a point where it gives itself over in the winter season to the entertainment of the colonies of travelers who seek those pleasures. The state throughout is picturesque and full of varied beauty, but perhaps the most perfect climate of the whole Florida coast is to be found at Miami, on Biscayne Bay. There cold weather is unknown and every outdoor amusement and pastime is enjoyed during the winter—yachting, boating, fishing and bathing in the surrounding waters being the chief attractions. At Miami is located the Royal Palm Hotel, one of the Flagler system hotels. This and other hotels have such a capacity as to increase very materially during the season the population of the resort, which, in 1910, was about 5500. From Miami a boatline runs to Nassau, in the Bahama Islands, where is located another magnificent hotel.

It is largely the winter increase of population, calling for traffic facilities, that has brought about the establishment of a street railway line, operated by the Miami

Traction Company. The line itself is as interesting as the resort is beautiful. For its operation the company has bought four 18-ft. longitudinal seat storage battery cars, the bodies and trucks built by The Brill Company and the batteries installed by the Electric Storage Battery Company, of Philadelphia.

Many things influenced the company to install on its line these self-contained electric units instead of a trolley system. Perhaps the chief of these was the fact that within a year, under the terms of its franchise, the company must have in operation two and one-half miles of track, a comparatively large trackage when consideration is taken of the fact that the company will operate but three cars, on a twenty-minute schedule, holding the fourth car in reserve for emergencies and special occasions. The cars will be in operation seventeen hours of each day, beginning at six o'clock in the morning. They will be run on such a schedule as to give each car a cessation during a certain portion of the day for the purpose of "boosting" the batteries.

In view of the fact that for some time to come the company will

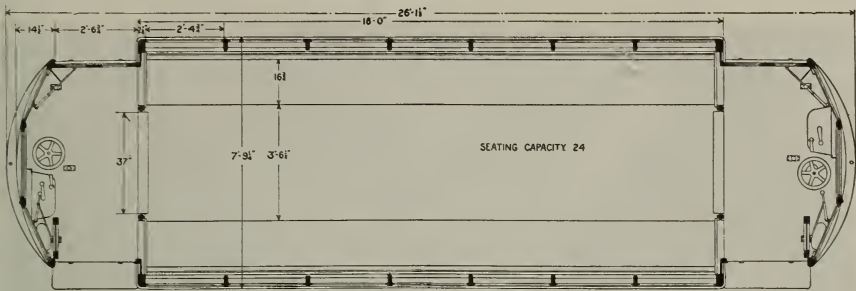


STORAGE BATTERY CARS FOR MIAMI. The car is of the same type as the successful Third Avenue cars. It is built light and yet with sufficient strength to stand up under the service.

operate only three cars, if ordinary trolley cars had been installed the load factor would have been extremely poor and, if the company had purchased current, provision necessarily would have been made for a heavy maximum demand which would have been many times the average load. However, being unable to purchase power from an outside source at a reasonable figure, since the local power company would have had to install special machinery to supply the cars and since it insisted on basing its price on the probable maximum demand, making the cost of current very high, the company abandoned that idea. Then, realizing that to install in its own powerhouse generators and driving machinery of a size large enough to take care of the maximum power demand would mean heavy initial investment, the company decided to cut down the

cost of its powerhouse and therefore ordered battery cars.

Also, one of the strongest reasons for the choice of the battery cars lay in the fact that the local authorities obtained the impression that the grounding of the current on a trolley system would set up a large amount of stray current and consequent electrolysis and damage to the water and gas pipes and mains. Coupled with this prejudice was the fact that Miami is somewhat of a show city, and the officials were not in favor of a railway system that carried with it wires, poles and feeders. So strong was the feeling in this direction that the franchise for some time was threatened with failure if the trolley system were used. Although when the franchise was obtained permission was given for the use of trolleys the understanding was that storage battery cars would be



STORAGE BATTERY CARS FOR MIAMI. Track to side sills, 2 ft. 5 1/2 in.; side sills over trolley boards, 8 ft. 3 1/4 in.; floor to headlining, 7 ft. 9 in.; track to step, 14 1/2 in.; step to platform, 12 in.; platform to floor, 7 in.; weight of body without electrical equipment, 4900 lb.; weight of truck, 4000 lb.; weight of electrical equipment, 506 lb.; weight of motors, 1290 lb.; total weight, 10696 lb.

in use until such time as Miami had grown to a point where the trolley would be a better proposition.

The franchise granted by the city has a life of thirty years, the limit placed on construction of the lines on the streets named being eight years. The franchise calls for the construction of two and one-half miles of track within the first year and of one mile of track per year for five years and for the first two years of these extensions the city may designate the location of the additional track. Stipulation is also made in the franchise for the payment by the company to the city of one percent of the gross annual receipts from all lines within the city when the population shall reach 40,000, this payment to continue during the entire life of the franchise. The franchise fixes a ten-hour day as the maximum for the company's employees and also fastens upon the company the obligation to reduce, within the first five years of operation, the fare for school children going to and from school to two and one-half cents.

The cars follow closely the design of the type of equipment built for the Third Avenue Railway of New York, which equipment has been operated very successfully. The important feature of the cars is their extremely light weight, consistent with strength, it being apparent that economical battery operation would require light cars, to conserve electrical energy and therefore to reduce operating expenses. However, though the weight be light, there is an increased dead weight per passenger because of the carrying of the batteries and the structure therefore had to be strong enough to insure a reasonable factor of safety above that required for the usual load alone. The batteries, which are made up of 58 cells, are placed under the longitudinal seats, thus doing away with the necessity of providing battery boxes under the cars and making inspection of the batteries easy.

In the underframe the side sills are of pine, 4 by 4 in., the end sills of oak, 4 by 4 in., reinforced with 3/4-in. steel plates and the crossings, 2 3/4 by 3 1/4-in. members, are of



STORAGE BATTERY CARS FOR MIAMI. The seats of the car are built so that the batteries, which are stored beneath them, may be readily accessible.

oak, the first crossing from each end reinforced with a $\frac{3}{8}$ -in. steel plate. In the body framing the corner posts are $2\frac{7}{8}$ in. thick and the side posts are $1\frac{1}{2}$ in. thick, the sweep of the posts being $6\frac{3}{4}$ in. The roof of the car is of the monitor type, full length of the body, with ventilator sash on each side and strengthened by concealed steel rafters, two to each roof. Inside the cars are finished in ash, including the doors, linings and mouldings. The centers of the headlinings are of agasote and the sides of birch veneer, the seats and backs of solid veneer.

The cars are mounted on Brill 71 trucks with a 7-ft. 6-in. wheel-base, the frame built up of struc-

tural shapes. The side sill of the car rests on and is fastened rigidly to an angle forming the top member of the truck frame, the bottom frame member, also of angle, fastened to the top member outside of the wheels and forming a truss for the truck by being brought down under the journal boxes by means of spacers. Each journal box has three springs, which are high and of small diameter and therefore are soft acting. The brake system has a center-pull, vertical-lever arrangement, the shoes placed outside of the wheels, and the system including half-ball brake hangers. The motors may be hung either outside or inside, the object in designing the truck so that the

motors may be hung outside being to make it possible to place the battery cells on the truck, the trays in such a construction resting on angle crossings inside the wheels. There are two motors to each truck, the type of motors used in these

cars having a combined maximum capacity of twenty-four horsepower. The 7-ft. 6-in. wheelbase gives the car capacity for taking curves as sharp as 35 ft. radius, an advantage for operation in a small city.

GAS-ELECTRIC LOCOMOTIVES FOR DAN PATCH LINES

ALL-STEEL CONSTRUCTION

THREE 60-ton gas-electric locomotives, the largest of the type ever constructed, recently have been placed in commission for freight, terminal and passenger service on the system of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, popularly called the Dan Patch Lines. Although more powerful, these locomotives follow closely the design of the 57-ton gas-electric locomotive which has been in successful operation on the system for more than a year, running between Minneapolis and Mankato, Minn., a distance of 107 miles. These four locomotives, with the thirteen gas-electric motor cars which the company has installed to date and with other equipment which includes trailer and freight cars, constitute a complete equipment which is unique on interurban lines, the Dan Patch having been the first railroad in the world to be operated entirely with gas-electric motive power.

The locomotives are General Electric machines, the bodies and trucks being built by the Wason Manufacturing Company, of

Springfield, Mass. Their installation follows the completion and delivery of forty-five freight cars and twelve trail cars by The Brill Company and of two gas-electric motor cars by the Wason Manufacturing Company, all of which equipment was described in the July issue of BRILL MAGAZINE.

On lines where the traffic is not of such nature as to call for car or train operation at frequent intervals, resulting in a large number of car miles per mile of track, and where the investment necessary for overhead construction and maintenance of "ready to run" power held always in contact with the units of the system is relatively high, the gas-electric units have found their place because of their reduction of this "ready to run" cost and the consequent increase of the true running expense. Well though the trolley system is well adapted for the operation of all urban, suburban and interurban lines where cars are run under short headway and the car miles per mile of track reach a high figure, the equipment made up of self-contained units is the one that

is selected to handle economically infrequent and irregular schedules, effecting a saving because of the power plant being in operation only when the units are gathering revenue. On such gas-electric lines as the Dan Patch the motor cars are used for the ordinary runs, and since the seating capacity of the average car is high—from 65 to 100—they take care of the ordinary traffic very well. Also, the

The new locomotives are built with the box type of cab extending almost the full length of the under-frame, which is built for unusually heavy service, four longitudinal 10-in. 30-lb. channels being used, two for the outside and two for the center sills. These sills extend the entire length of the frame and are tied together by heavy end frame steel bumpers and bolster plates, each channel being riveted to the



DAN PATCH LOCOMOTIVES. These locomotives are the largest machines of the type ever built. They have a maximum tractive effort of 32,200 lb.

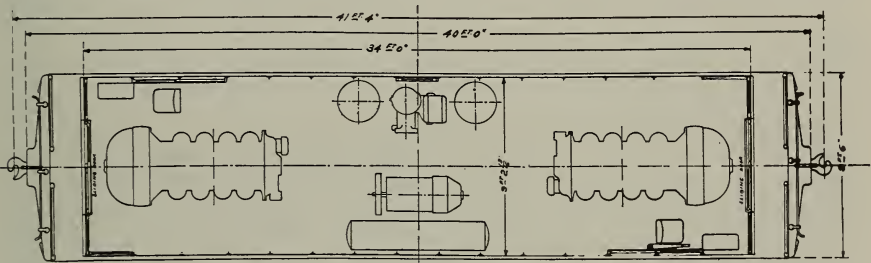
capacity of the motor cars may be augmented by giving them a trailer car, thus taking care of traffic which is somewhat heavy. However, the gas-electric locomotives, with their greater power, are well suited for excursion trains, where several trailers are used, and for extra heavy traffic of all sorts. Also, they have been proved economic of operation in freight service, their potential tractive effort being so high as to make possible the hauling of very heavy loads—and therefore the bringing in of large revenue—for a uniform operating cost.

webs of the end frame castings and bolted to the top and bottom bolster plates. The bolsters are built up of 12 by $1\frac{1}{8}$ -in. steel plates, the bottom bolster being carried across the frame and riveted to all four longitudinal sills. The steel center plate castings are bolted to the bolster plates, and cross sills are riveted in where they are needed to support equipment which is hung below the frame.

The power for the locomotives is obtained from two gas-electric generating sets, 175-hp., 4-cycle gasoline engines being direct-connected to 600-volt, commutating-pole, com-

pound-wound, electric generators. The sets are started with air pressure, in the same way as in the gas-electric motor cars, but with the additional feature that when one set is running the other set may be started electrically from the first. The control is so arranged that either one or both of the generating units—depending upon the trailer load—may be used to operate the locomotives from either end. Flexibility of control and economic operation, it is

the controller. The motors are reversed in the usual manner without stopping the engines, which always rotate in the same direction. This, in an emergency, allows the train to be brought to a stop quickly and independent of the brakes. The maximum tractive effort of the locomotives is 32,200 lb., the performance of the machines showing a tractive effort of 16,000 lb. at a speed of five miles per hour, 3,500 lb. at 30 miles per hour and 1,000 lb. at 50 miles per



DAN PATCH LOCOMOTIVES. The machines, fully equipped, weigh 120,000 lb. The height over all is 14 ft. 10 1/2 in.; width over all, 10 ft. 2 in.; centers of bolsters, 24 ft.; wheelbase, 6 ft. 10 in.; minimum curve radius negotiable, 100 ft.

claimed, result from electrical transmission of energy, the engines being able to rotate at normal speed no matter what the speed of the locomotive. Thus they deliver their maximum power at all times, which is advantageous where emergencies arise to create heavy current demands.

The motors are connected permanently in pairs in parallel and the pairs, operated like single motors, are placed progressively in series and parallel. The speed changes of the motors are effected by governing the voltage through varying the strength of the generating fields, which is accomplished by the movement of one handle on

hour. The locomotives are driven by four 600-volt, 100-hp. motors, thus making each axle a driver.

The locomotives are arranged to be operated at both ends. The generating sets and controllers are installed in each end of the cab, with the auxiliary lighting set, air compressor and storage tanks grouped in the central section. For making easy the installation of these generating sets and other equipment, the ends of the cab are constructed so that they may be removed.

In the upperframe of the car the side posts and rafters are of "T" iron and angles covered with steel plates having lap and butt joints.

SUGGESTIVE SUBJECTS

NOTE.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

OPTIMISM

YOU are a railway man—perhaps a conductor, perhaps a motorman. And you are a good railway man and as such receive the salary of a good railway man. But do you ever look beyond your weekly envelope? Do you ever consider how best to put yourself on the moving stairway of life, pointed upward? You do? All right. But, having planted yourself, as you believe, on the bottom steps, has it ever seemed to you that the mechanism of the whole thing has gone wrong, the gears snarled and reversed and that you are being carried down instead of up? Of course. Those moments come often to every man, but it's the man with optimism that tosses such things from his brain as so much chaff, and it's that optimism that you must have to stay ever with that climbing stairway. It's the man with the smiling happy face, laughing his way through the world, that mounts to success and it's his optimism that you must try to imitate. If things look dark you only make them look darker by frowning. Smile and the clouds will lift. There's no job in the world too small to be optimistic about, for, if you care to look, you will find some fellow who would be more than willing to be ringing up fares in your uniform or clanging the platform gong and drawing your pay envelope. Look below you now and then (there's always a below) and see the men who are toiling up toward your own height and then, full of optimism, fasten your eyes dead ahead and throw your controller handle on full speed ahead. Give your life car all nine points and keep your motors full of the juice of optimism and your climb will be easier and more rapid than you dare to hope.

THE MEDICINE OF EXPERIENCE

Every time you hear a trolley car conductor or motorman growl about his work be sure there's something wrong, not with the work but with him. Maybe he needs a dose of the medicine of experience. Give it to him second-hand by pointing out to him the thousands of men who are working laboriously but steadily toward the salary he is getting now. And then point him ahead and give him as big a shove as you can.

It's the plugger who sticks after he gets there.

MORE NEWLY-WORDED WARNINGS

DO not try to cross the tracks ahead of a moving car, no matter how far off it may seem. Distances are deceptive and it is hard to estimate speeds of moving objects. Then, even if you are able to estimate correctly the speed of the car, you may slip on the tracks or, if you are in a vehicle, you may stall there. Play safe!

Make it a rule, in driving an automobile or a horse or even if walking, to stop before you cross a track and listen for approaching cars. Be sure to look both ways before crossing. The few seconds you will lose in doing this each time are worth losing when you consider the many painful hours you may be forced to spend in a hospital if you try to save those seconds.

In signaling a car to stop, do not stand on the track. It is not necessary. The motorman will see you just as well if you stand back from the track and move your arm up and down as a signal.

Never stand too close to the track. The suction of a rapidly-moving car or train is powerful and often sufficient to draw you beneath the wheels.

Don't crowd close to the edge of the platform when a car approaches. You may push someone else under the wheels.

In all cases remember that the company's chief concern is with your safety. Help in the work of making yourself absolutely safe from painful accidents.

An ounce of prevention is worth a pound and a half of cure. Be safe!

ONCE TO EVERY MAN

SOME wise old fellow once said that opportunity comes but once to every man. Don't believe it. She pays a visit to your door a hundred or more times every day. And so if you think you have missed what you have been pleased to call your one big opportunity be sure that you are fooling yourself into ignoring other chances just as powerful that bob up at every step. Each chance to be courteous to a patron is an opportunity to better yourself in the railway world. Each discourteous, thoughtless, careless word or act is worse than an opportunity thrown away—it's just so many side trackings of your car of prosperity.

Safety first and then courtesy a close second—let that be your motto.

Many a man has firmly convinced himself that he is not satisfied with his work, only to find out later that he was better off than he thought. Don't throw away the dirty water until you get a bucketful of clean. And perhaps, while you are looking for the clean water, the dirty water will have cleared itself up. Go slow.

THE CALAMITY HOWLER

YOU probably have read of the calamity howler in countless newspapers whose policy is centered around prosperity, whose editorials carry through them a preachment of optimism and whose aim is to calm and reassure the public. You have been told and have become firmly convinced that the calamity howler is a man who mounds up a menace in the way of the business of the country. You are indignant at him. You want to make him stop his yapping, to put into him some of your own knowledge of things as they really are, for you know that "big business" by no means is going to rack and ruin. Your ideas about business in general are good; you are firmly convinced that prosperity has not deserted the country, as he would have us believe. But—do you ever stop to think that this whole proposition may be brought down to other things beside "big business"? In other words, are you not, Mr. Conductor, Mr. Motorman, a bit of a calamity howler yourself? Are you firmly convinced that there is a future in railroading which makes staying in that profession desirable? Or do you complain that you are in a rut and that there is no chance for you to get on? Do you reason to yourself that, for the same reason it is true that "big business" is booming, your own little job is being squeezed? If you do you are wrong. It's your job and thousands of other similar jobs that go to make up "big business" and to make that "big business" successful. You are necessary to mankind—there have to be railway men. You are necessary to "big business"—there have to be men such as you, who, starting well down the line, are capable and willing to work their way to the top. "Big business" exists because you are there, pulling ever toward the top. It does not feed on you; it feeds you. And one of these days, having done your work honestly, enthusiastically and well, you will be a part of "big business" just as surely as the tide rises and falls. Life is short and there have to be replacements in its machinery. Be sure that you are ready and eager to expand out to seize your opportunity.

When things go wrong, the car balks and sputters, the wheels refuse to take hold and the brakes whine and stick think of the man further up, who started where you are. Would he swear and do nothing else? Perhaps the former but certainly not the latter. No, he would study his car to find the trouble.

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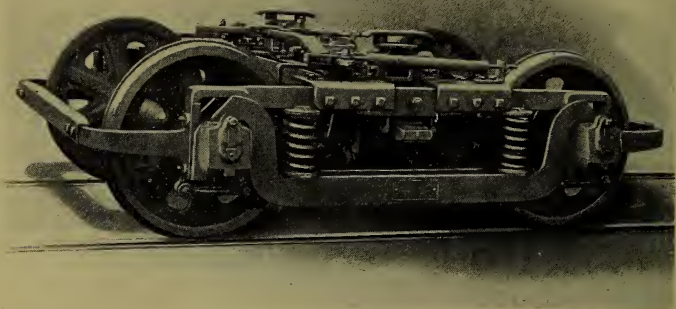
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BRILL 27-M.C.B. TRUCK

SOLID-FORGED side frames—frames in which the pedestals are an integral part of the forging—are exclusive features of all Brill trucks; but perhaps on no other truck is the advantage of their use so great as on the 27-M.C.B. Wide experience with all types of construction has shown that the truck with solid-forged side frames is the only one capable of maintaining squareness and providing security against deterioration and breakdowns. Built for high speed, the 27-M.C.B. must carry powerful motors, but the torque of these motors, the frequent strains of rapid brake applications while running at high speed, and the cornerwise thrust in taking curves, are taken care of with safety, efficiency and economy by the solid-forged frame. Above all, these frames are guaranteed against breakage, except when caused by collision or derailment.

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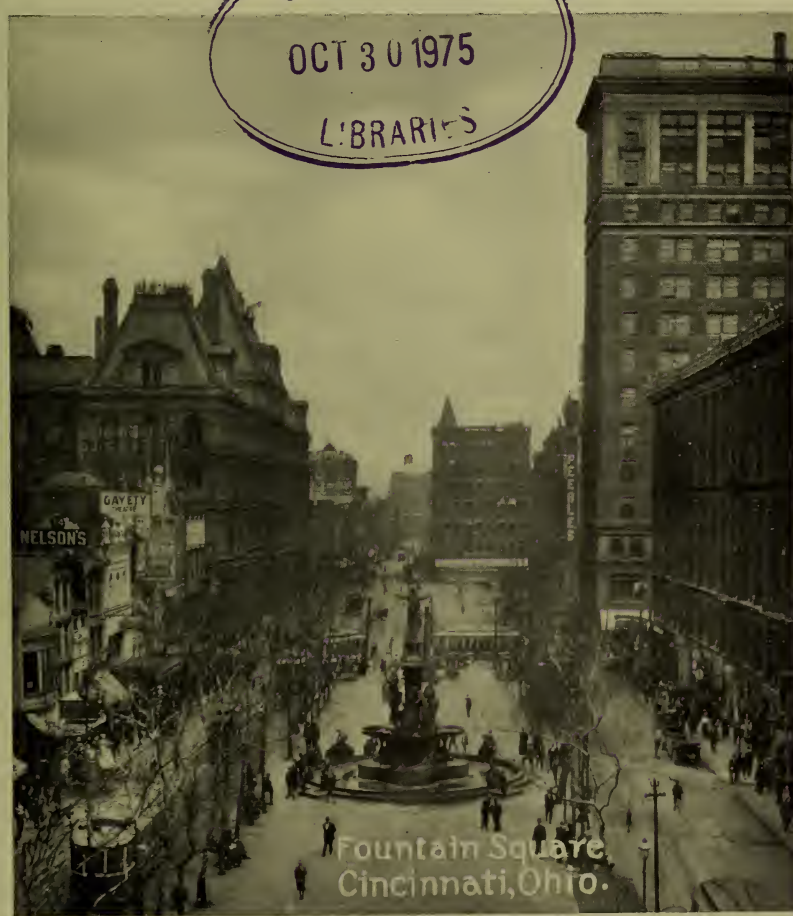
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BRILL TWILL-WOVEN RATTAN

NEXT to the floor and the steps, the seat cushions have to bear most of the brunt of the wear and tear on the car by its occupants. Nothing is tougher than woven rattan for seat covering, but even rattan will wear through in places under the incessant rubbing and general hard service that it gets; and worn, spotty and dull seat covering makes the whole car look shabby. Nothing goes so far towards brightening up a car as renewing the seat covering—it gives a spick-and-span appearance that is first cousin to newness. Brill twill-woven rattan, canvas-lined for cushions and unlined for backs, is made in all lengths from 18 to 36 inches.



G. E. Duff

PRESIDENT, WEST PENN TRACTION COMPANY

“Temporary expedients such as short-time obligations have only added to your financial burdens instead of lightening them, and, notwithstanding that they may appear so outwardly, public utilities will not be really and soundly prosperous until all their fixed investments in plant have been permanently financed with stock or long-term bonds. It is a bad thing to have a debt that you never intend to pay and never can pay, and that is what such short-time notes are.”

—Quotation from address on “Public Relations” by Guy E. Tripp at the Mid-Winter Banquet of the American Electric Railway Association at the Waldorf-Astoria, New York, on January 29, 1914.

DECEMBER 15, 1915

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GUY EASTMAN TRIPP

GUY EASTMAN TRIPP was born in Wells, York County, Maine, April 22, 1865, of English ancestry. Educated in Berwick Academy in South Berwick, Maine, he entered upon his business career with the Eastern Railroad Company in 1883. Seven years later he entered the service of the Thomson Houston Electric Company. After the consolidation of that company with the Edison Company, thus forming the General Electric Company, he became one of the traveling auditors of the consolidated companies. In 1897 he took a position with the firm of Stone and Webster, occupying various positions until, at the time he severed his connection with the firm, he was Vice-President of the Stone and Webster Management Association and Vice-President of the Stone and Webster Engineering Corporation. It was while managing the affairs of that company in the West and South that he was called to New York City to take the chairmanship of the Joint Committee on Reorganization of the Metropolitan Street Railway. Mr. Tripp, besides being chairman of the board of the Westinghouse Electric & Manufacturing Company, is a director of the following: American Surety Company, American Water Works & Electric Company, Bryant Electric Company, Canadian Westinghouse Company, Ltd., Chase National Bank, Electric Properties Corporation, Franklin Trust Company, The Morris Plan Company of New York, New England Westinghouse Company, R. D. Nuttall Company, 145th Street Crosstown Railroad Company, Pennsylvania Electric Company, Perkins Electric Switch Manufacturing Company, J. Stevens Arms & Tool Company, United States Mortgage & Trust Company, The Westinghouse Machine Company, Westinghouse Church Kerr & Company, Westinghouse Lamp Company, Pittsburgh Meter Company, West Penn Traction Company, West Penn Traction & Water Power Company, West Penn Railways Company and Wheeling Traction Company, Chairman of Board of Westinghouse Metallfaden Glühlampenfabrik Gesellschaft m. b. H., Vienna, and Westinghouse Metal Filament Lamp Company Ltd., of London. He belongs to the following clubs: Metropolitan, Union League (New York), Engineers (Boston), Wompatuck (Hingham, Mass.), Universities Club of London. He is also a member of the New York Board of Trade and Transportation, Chamber of Commerce of the State of New York, and American Academy of Political & Social Science, Philadelphia.

INTERURBAN CENTERS AND INTERURBAN CARS

CINCINNATI



ITUATED in the southern part of Ohio, on the north bank of the Ohio River, at a point which is nearer to the center of population than

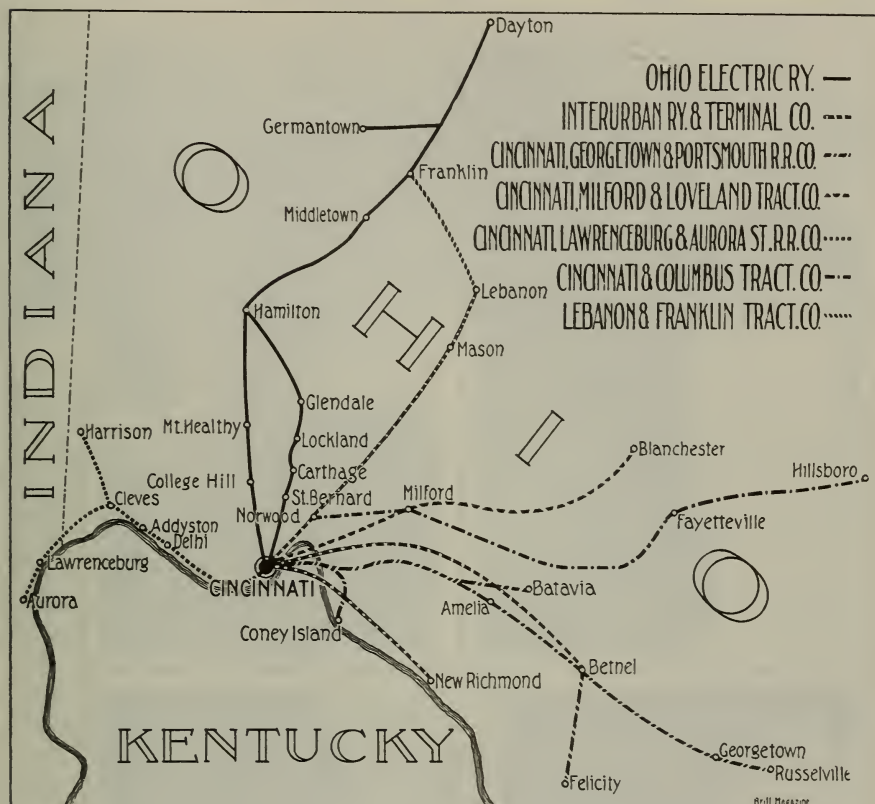
any other city, Cincinnati has grown to be one of the most important railway centers of the Middle West, the river connection with Pittsburgh and important points in Kentucky and West Virginia also adding materially to her prosperity. The city, as regards population, is almost twice the size indicated by census returns, because of the fact that it is surrounded by communities which never have been annexed, but nevertheless form an integral part of the metropolis. For years the city has been an important distributing point for iron, coal and lumber, and is one of the most important American meat centers. The manufacture of machine tools, wood-working machinery and ornamental iron plays a large part in the industries, Cincinnati leading the world in each of the three.

That the surrounding country is naturally adapted to agriculture is indicated by the fact that more fruits and vegetables are shipped through the Cincinnati gateway

than to any other market, excepting New York. The city has the distinction of being the only municipality in the country to own a university and a steam railroad; also it has the largest movable dam in the world.

The city occupies the northern half of a circular amphitheatre of hills about $2\frac{1}{2}$ miles in diameter, bisected east and west by the Ohio River, which at this point makes a great southward sweep. In the southern half, which in turn is bisected by the Licking, lie the Kentucky suburbs of the city, large cities in themselves. The northern semi-circle rises from the river in two great terraces, sloping northward to a third level at the summit. Originally these terraces were very distinct, but grading operations have confused them somewhat. The lower platform is a bluff about 65 ft. above low water, the second 50 to 100 ft. higher and the crest hills 150 to 300 ft. above that level, or about 500 ft. high at the summit. Mt. Adams, Mt. Lookout, Mt. Auburn and Fairview Heights give fine views of the surrounding country and are reached by inclined plane cable railways which in the main are used for the lifting of the electric cars.

On the western side of the city from north to south runs Mill Creek, the remains of a once huge glacial stream, whose gently sloping valley, half a mile or more



wide, forms an easy path into the heart of the city and was an indispensable factor in determining its position. Highways, canals and railroads come through it, and the city's growth has pushed farther up this valley than in any other direction.

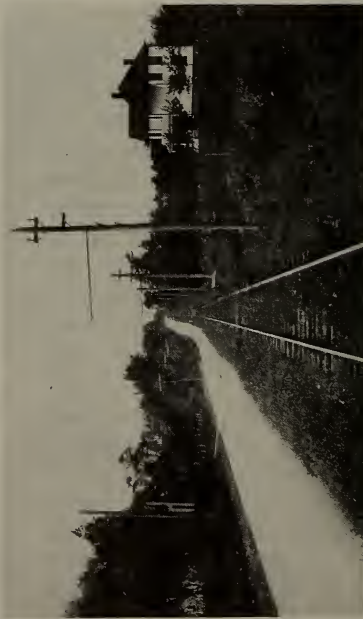
At present there are nine lines of interurban electric railways, with an aggregate length of about 350 miles of roadbed, operating out of Cincinnati. Five of these lines come into the heart of the city, four of them having freight and passenger terminals on Sycamore Street, one of Cincinnati's most

important streets, while the fifth line operates within the city as a part of the street car system, being owned by the same company. The other four interurban lines stop at or near the city limits, passengers transferring to city cars in order to reach the center of the city. This arrangement is made necessary because of the difference in the gauge of the track, the city lines and the five interurban lines operating over the city tracks having a gauge of 5 ft. 2 $\frac{1}{4}$ in., while the other lines are standard gauge—4 ft. 8 $\frac{1}{2}$ in.

The lines operating into the

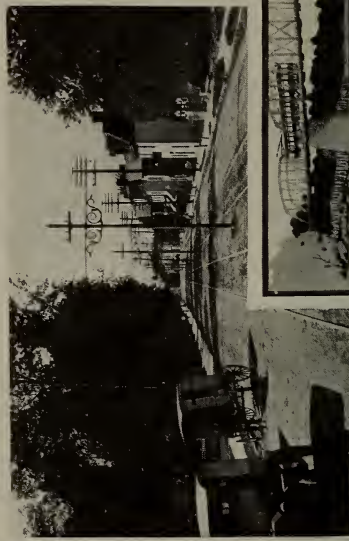


Sub-station at Forestville
Single-track, airm construction, Interurban Division



INTERURBAN RAILWAY & TERMINAL COMPANY

Coney Island Power House
Double-track, center-pole bracket construction, Rapid Railway Division





INTERURBAN CENTERS AND CARS. Standard car in use on lines of company

heart of the city include the Cincinnati, Milford and Loveland Traction Company, the Rapid, Eastern and Suburban Divisions of the Interurban Railway and Terminal Company and the "Mill Creek Valley" line of the Ohio Traction Company; those operating to the city limits and transferring their passengers include the Cincinnati, Georgetown and Portsmouth Railway, the Cincinnati & Columbus Traction Company, the Cincinnati, Dayton and Toledo Division of the Ohio Electric Railway System and the Cincinnati, Lawrenceburg and Aurora Railroad.

To obviate the loss of time and other difficulties connected with the present method of operation, the city authorities have had drawn up for them a number of plans conceived by one of the leading consulting electrical engineers of the country. Each plan having as its object the construction of an interurban terminal system whereby

all the interurban lines would be enabled to operate into the heart of the city. The city officials and the various civic organizations are energetically studying these plans and a satisfactory solution seems to be near at hand.

The Cincinnati, Dayton and Toledo Railway is a part of the Ohio Electric Railway System, one of the largest systems in the country. This division operates between Cincinnati and Dayton, having terminals in the former city at Spring Grove Avenue, where passengers transfer to city cars. The line, which is standard gauge, is about 60 miles long, including the Germantown, College Hill and Mt.



INTERURBAN CENTERS AND CARS. Deer Park car house



INTERURBAN CENTERS AND CARS. Norwood Terminal Station of the Cincinnati & Columbus Traction Company

Healthy branches. A line also runs from Dayton to Richmond, Ind., where connection is made with the Terre Haute, Indianapolis and Eastern Traction Company to Indianapolis.

In addition to the electric railway business which it conducts the company does electric light and power business in Zanesville, West Alexandria and Lima, and has a steam-heating plant in Lima; also it furnishes electric current to a number of smaller towns located at various points on the system. The statistics for the year 1914 show a total of 4,620,738 passengers and 88,718 tons of freight carried on the Cincinnati and Dayton Division, an average of twenty-one

trains being operated over the lines every day. The territory through which this division runs is known as the Miami Valley, and is one of the most thriving sections of the Middle West, its industries being of diverse nature and many of its

plants very extensive. The towns and cities on the line, with their approximate populations, follow: Mt. Healthy, 1,799; Hamilton, 35,279; Trenton, 564; Middletown, 13,152; Franklin, 2,659; Miamisburg, 4,271; West Carrollton, 1,285; and Dayton, 116,577.

Middletown is one of the leading tobacco centers of the world, the annual output being about 150,000,000 lb. Here is also located the immense plant of the American Rolling Mills, Hamilton is the headquarters for a number of concerns whose outputs have national reputations. The soil of the whole territory served by the line is very fertile and the chain of manufacturing towns is interspersed with

well-kept, productive farms, the produce from which finds a ready market near at hand. In each of the towns served the company maintains well-equipped passenger and freight offices and in Dayton the company owns its terminal facilities, plans for the enlargement



INTERURBAN CENTERS AND CARS. Power station at Perintown

and improvement of which are under consideration.

The Cincinnati, Georgetown and Portsmouth Railroad originally was a narrow-gauge steam road designed to serve the population residing east of the city of Cincinnati. The pres-

ent owners took the property over in 1901 with the intention of converting it into a modern, up-to-date electric railway. The road has been rebuilt completely and made into a standard-gauge line equipped with a modern power plant. Also, the roadbed has been improved, a large amount of gravel ballasting has been done and a complete drainage system installed. In addition considerable work has been done by the company in filling in under trestles spanning valleys and depressions along the lines of the company.

The right of way over which the company operates is private in almost its entirety, the majority being 60 ft. wide with ample sidings and facilities for freight business in all of the towns through which the road passes. In addition the company owns terminals in Cincinnati, where it has connection with the Pennsylvania Railroad, which receives and discharges



INTERURBAN CENTERS AND CARS. Trestle and bridge over Little Miami River

all freight. A right-of-way was obtained by the company to extend its lines from Georgetown, Ohio, to West Union, a countyseat, a distance of twenty-five miles due east. At the present time seven miles of this line is in operation, extending to Russellville.

At Olive Branch, where the power house is located, there has been constructed a lake which covers ten or twelve acres of ground. The company owns about fifty acres of ground here and this has been laid out and made into a pleasure park called Lake Allyn. At this point the elevation is about 1,000 ft. above sea level or about 500 ft. above the level of Cincinnati.



INTERURBAN CENTERS AND CARS. Combination car



OHIO ELECTRIC RAILWAY

- 1 All-steel, center-entrance passenger, smoking and baggage car
- 2 Motor passenger excursion car
- 3 Motor freight car
- 4 Combination passenger, smoking and baggage car



INTERURBAN CENTERS AND CARS. Lindenwald power house of Ohio Electric Railway Company

The lines of the company extend from Cincinnati to Georgetown, a distance of forty-two miles, with branch lines running from Cincinnati to Coney Island, a river resort, and from the main line to the county seat of Batavia and from Georgetown to Russellville. The cars of the company are operated into and out of Cincinnati over the tracks of the Cincinnati Traction Company, the same crews remaining in charge of the cars. The road, shortly after leaving the Carrel Street terminal in Cincinnati reaches an altitude of from 300 to 400 ft. above the Ohio River and passes thence over an elevated country broken by ravines and winding valleys full of beautiful scenic effects. The towns it serves include California, Mt. Washington, Ellenora, Fruit Hill, Forestville, Cherry Grove, Mt. Carmel, Summerside, Olive Branch, Ba-

tavia, Braziers, Amelia, Hamlet, Wiltsee, Fair Oak, Hulington, South Bantam, Bantam, Bethel, Hamersville, Feesburg, Gillette, Sunshine, Tracys and Georgetown.

The equipment of the company includes eight standard Pullman type passenger cars, six combination baggage and passenger cars, four of which are used on branch lines, one express and mail car for use between Carrel Street and Sycamore Street Station. This car conforms to the city gauge of 5 ft. 2½ in. All of the other cars have quadruple equipment and platform control.

Since February, 1915, all freight has been handled by electric instead of steam locomotives, the electric equipment consisting of one 50-ton locomotive with 75-hp. motors and one locomotive of wood construction recently built at the company's shops and equipped

with four 75-hp. motors. In addition there are two work cars, both having been assembled at the company's shops. One is used in work-train service and the other as a line-repair car. There is also a number of standard flat and coal cars to take care of local freight.

at its Lake Allyn steam power plant, whose present and ultimate capacity is 1,200 and 1,800 kw. The current is transmitted at 16,500 volts and fed into the line at 600 volts, sub-stations being located at Mt. Washington, Bethel and Sunshine.



INTERURBAN CENTERS AND CARS. Double-track roadbed on lines of Cincinnati, Milford & Loveland. Looking east at Indian Hill

The total tributary population of the road, exclusive of Cincinnati, is about 30,000. The road connects with the P. C. C. & St. L. Ry. at Carrel Street, the Norfolk and Western Railway at Batavia, the Felicity and Bethel Railroad at Bethel and with the Ohio River and Columbus Ry. at Georgetown. The company generates its own current

The standard car used by the company is 50 ft. long over the vestibules, 51 ft. 4 in. long over the bumpers, 8 ft. 10 in. wide over the side sheathing, has a seating capacity of 52 and weighs about 64,000 lb., fully equipped, the car body alone weighing 32,000 lb. The cars are designed for single-end operation, their underframes

are of wood and the outside sheathing of poplar, and they have a maximum capacity of fifty-five miles per hour. There are ten cars in normal operation with a total of fourteen available.

Merchandise and carload freight are handled by standard freight

Traction Company operates from the outskirts of Norwood, a suburb of Cincinnati, to Hillsboro, the most important towns served by the line being Madisonville, Madeira, Milford, Perintown, Stone Lick and Boston—from each of which latter two places branch lines



INTERURBAN CENTERS AND CARS. Typical stretch of single-track road. Looking east at Clark Station

equipment, and, through connections at Carrel Street and at Georgetown, daily interchange of freight cars is made possible. The traffic statistics of the company for last year show a total of 791,615 passengers carried with a car mileage of 489,965, and a total of 75,028 tons of freight handled.

The Cincinnati and Columbus

run out to Batavia—Monterey, Marathon, Fayetteville, Allensburg and Fairview. The total tributary population of the line, exclusive of the city of Cincinnati, is estimated at 30,000. The company furnishes its own current, having a steam power plant located at Perintown, the current being sent out over the lines, of which



INTERURBAN CENTERS AND CARS. Terminal station at Madisonville, on Cincinnati, Milford & Loveland

there are 53 miles, at a voltage of 16,500, the line operating voltage being 600. The sub-stations are located at Madeira, Marathon and Allensburg.

The standard car of the company measures 57 ft. over the vestibules, 59 ft. over the bumpers and is 9 ft. wide over the side sheathing, with a seating capacity of 66 and a weight of car body of 20 tons and a total weight of car and trucks fully equipped of 39 tons. The cars, which are designed for single-end operation, are operated singly. Their underframes

are of steel "I" beams with wooden fillers and the side construction is of frame. The company operates freight and express business the same as is done on steam lines, using for its passenger service seven cars under normal conditions, with a total of eight available. The traffic statistics for the last year show a total of

668,099 passengers carried with a car mileage of 460,244.

There are under consideration two propositions for extensions in which the company is interested. The first is the entrance into Cincinnati, the second the completion of the "Hillsboro, Bainbridge, Cynthiana and Chillicothe" line. The former is in fair shape and the body backing the latter project has appealed to the Public Utilities Commission for permission to issue bonds. On the whole, the officials of the company feel, the prospect of finishing each project is exceedingly bright and each will be of advantage to the company.

The Cincinnati, Lawrenceburg and Aurora Electric Street Railway Company connects Delhi, Home City, Addyston, North Bend, Cleves, Harrison, Lawrenceburg and Aurora. The power



INTERURBAN CENTERS AND CARS. Typical freight car

house and repair shop of the company are located at North Bend, Ohio. The roadbed, which is of standard gauge, is thirty-three miles in length and for the operation of its schedules the company has twelve motor cars.

The Interurban Railway and Terminal Company's property consists of three divisions operating out of a terminal station on Sycamore Street, in Cincinnati's business center. These divisions are the Rapid Division, running from the terminal station in Cincinnati north to Lebanon, Ohio, a distance of thirty-four miles; the Suburban Division, running from the terminal in Cincinnati northeast to Bethel, Ohio, a distance of thirty-two miles; and the Eastern Division, running from the terminal in Cincinnati east along the banks of the Ohio River to New Richmond, Ohio, a distance of twenty-two miles.

Since its construction in 1902 and 1903 the company has suffered severe financial losses and damage to its property from fire and flood, the revenue of the company being reduced between 1906 and 1913 by reason of the interruptions in operation. Financial difficulties caused the



INTERURBAN CENTERS AND CARS. Power house at Milford

maintenance of the property to fall off and in 1914 rehabilitation became necessary and a change of management was made. At the present the rehabilitation is being pushed ahead, the equipment of the company having been thoroughly overhauled, the cars rebuilt and repainted, the power and sub-stations repaired, overhead material replaced and new ballasting put in and the property is being brought up to a good state of maintenance, permitting of increased earning capacity and reduced cost of operation.



INTERURBAN CENTERS AND CARS. Near Manilla Station



CINCINNATI, GEORGETOWN & PORTSMOUTH RAILROAD

- 1 Freight and passenger station at Hamlet
- 2 Station and yards at Georgetown
- 3 Bridge over White Oak Creek

- 4 Carrel Street Station, Cincinnati
- 5 Station at Bethel
- 6 California Junction

The lines of the company serve districts whose total tributary population amounts to 5,000 for each of the three divisions. Connection is made with the Lebanon and Franklin Traction Company at Lebanon. The company gets its current from its own steam power plant, located at Coney Island, with a capacity of 7,000 A. C. and 1,000 D. C., the transmission voltage being 11,000 and the line voltage 650, sub-stations being located at Kings Mills, Deer Park, Amelia, Forestville and Coney Island.

The standard car used by the company measures 49 ft. over the vestibules, 50 ft. over the bumpers and 8 ft. 2 in. over the side sheathing, has a seating capacity of 58 persons and weighs 71,000 lb. fully equipped, the car body alone weighing 34,000 lb. The cars, which are designed for single-end operation, are built on underframes of steel, the side construction being of semi-steel, and they are operated singly. General freight and express business is carried on. The company has 17 cars in normal operation, with 27 cars available.

The statistics of the company for last year show a total of 2,199,636 passengers carried with a car mileage of 925,293 and 10,000 tons of freight and 200,000 pieces of express matter carried with a total freight and express mileage of 147,894.

The Cincinnati, Milford and Loveland Traction Company operates from Cincinnati to Blanchester, a town of 2,000, serving en route Madisonville, Plainville, Indian Hill, Newtown, Terrace Park,

Milford, Mulberry, Goshen Station, Newtonville, Edenton and Woodville, towns which give the road a total tributary population of about 30,000. The company owns the Cincinnati, Milford and Goshen Traction Company and the Cincinnati, Milford and Eastern Traction Company, proposed lines. Two parks, Woodland and Bamford Hills, are reached by the road and they materially increase the passenger revenue of the company during the pleasure-traffic months. The road connects with the Cincinnati and Columbus Traction Company at Milford, where is located a steam power plant of the company with a capacity of 1,000 kw. The current generated by the company is sold for lighting purposes as well as being used for driving the cars of the company. It is transmitted at 16,500 volts and fed into the trolley line at 650 volts, sub-stations being located at Indian Hill, Milford and Newtonville.

The standard car in use on the road measures 46 ft. over the vestibules and 47 ft. over the bumpers with a width over side sheathing of 8 ft. and a seating capacity of 50 persons, and is built for a single-end operation, being run singly. The company does a miscellaneous freight and express business in addition to its passenger business. For the operation of its lines it has four cars in service under normal conditions with a total of eleven cars available. The roadbed is laid outside of the city on private right-of-way and public highways, the road running for about five miles on the latter.

CENTER-ENTRANCE CAR FOR YOUNGSTOWN & SOUTHERN

BRILL 27-M.C.B. TRUCKS

CONSTITUTING a striking example of the entire practicability of the center-entrance type of car for high-speed interurban service is a 54-ft. 7 $\frac{1}{4}$ -in. center-entrance, single end, all-steel frame passenger, smoker and

therefore proves that the low construction in the center forms no obstacle to the maintenance of good schedules over roadbeds laid through the country, and this despite the small clearance of 9 $\frac{3}{16}$ in. between the rail and the



CENTER-ENTRANCE TYPE. This car is a striking example of the entire practicability of the center-entrance type of car for high-speed interurban service

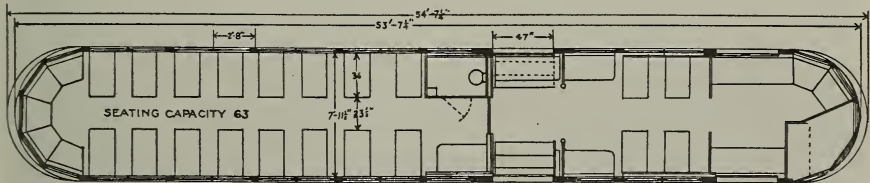
baggage car designed for use on a fifty-minute schedule over twenty miles of the Youngstown & Southern Railway Company's lines between Youngstown, Ohio, and Leetonia and built by the G. C. Kuhlman Car Company, of Cleveland, Ohio. The car is mounted on Brill 27 M. C. B. 2 trucks, built for a maximum speed of fifty miles an hour with a wheelbase of 7 ft. and with 34-in. wheels and the fact that it will make its run of twenty miles in 50 minutes with an average of ten stops en route indicates the high rate of speed to which it must be accelerated between stations and

underside of the side sills at the center door, which clearance gives the car the advantage of being low enough at that point to be built without an outside step, thus saving time in the loading and unloading of passengers and adding to the safety of the car. The drop in the center brings the step but 14 in. from the rail and between the step and the floor there are three 10 $\frac{1}{2}$ -in. risers 10 in. deep, this construction being made possible by giving the underside of the side sills at the bolsters a light-load clearance of 3 ft. 3 $\frac{7}{8}$ in., the side sill carried as a continuous member

from corner post to corner post and bent down in the middle to support the steps.

In the construction of the steel frame of the car the weight is kept as low as would be consistent with safety, the body without electrical equipment weighing but 27,000 lb., which is remarkably low when the seating capacity of 63 is taken into consideration. This is accomplished in part by utilizing the top rails, side plates and side sills, tied into a girder, to carry the strain instead of throwing the entire load on the side sills, in which case those

tion by the company, will be run from the center of Youngstown, whose population is 115,000, to the suburbs of Leetonia, with a population of 5,000, passing through a section whose principal industries are steel manufacturing and coal mining and farming, the transportation of laborers and farmers and the members of their families forming a good source of revenue, which revenue is increased materially in the summertime on account of racing and park traffic, each of which forms a very considerable item. The lines are laid on a compara-



CENTER-ENTRANCE TYPE. Width over side posts, 8 ft. 4 $\frac{1}{4}$ in.; width over all, 8 ft. 6 $\frac{3}{4}$ in.; height from rail to underside of side sills, 3 ft. 3 $\frac{3}{4}$ in.; height from rail to floor, 3 ft. 9 $\frac{3}{4}$ in.; height from rail to trolley plank, 12 ft. 2 $\frac{1}{8}$ in.; height from rail to first step, 14 $\frac{1}{2}$ in.; weight of carbody without electrical equipment, 27,000 lb.; weight of electrical equipment, 2400 lb.; weight of air-brake equipment, 2350 lb.; weight of motor and gears, 13,140 lb.; weight of trucks, 18,620 lb.; total weight, 93,510 lb.

members would have to be considerably heavier properly to carry the load to the bolsters. Where the doors—the center-entrance door and the baggage door—are cut through the side plates angle braces are used on both the top rails and the side sills, thus strengthening the car at a point which otherwise would be weakened and only in a small degree increasing the weight. in fact decreasing it when consideration is taken of the fact that placing the doors inside of the end sills does away with heavy end knees.

The car, which is radically different from the other cars in opera-

tively level roadbed, there being a 2 per cent. grade outside of Youngstown, extending from that city to Kyles Corner, a distance of two miles. One of the best features of the car is its seating arrangement, which is particularly good for interurban service, where the major part of the passengers ride for fairly long distances and therefore are prone more frequently to patronize a line whose cars give them comfortable seats. The car will seat 38 persons on cross seats facing front, two facing rear, six others sitting facing front on a seat which follows the outline of the rear windows and the remainder

are provided with longitudinal seats. There are but five seats in the car which face the rear and three of these do so only indirectly, being placed before the two left-hand windows in the front of the car. In the baggage compartment, before each of the sliding doors, there is a longitudinal seat taking care of three persons.

The construction of the sides of the car is arranged for twin windows, with alternating single and double pier posts. These side posts are of $1\frac{1}{2}$ by 2 by $\frac{5}{16}$ to $\frac{1}{4}$ -in. tees. The letter panels are of $\frac{1}{8}$ -in. plate and the side plates are of $\frac{3}{32}$ -in. steel. Kuhlman window

guards are employed, which consist of diamond mesh screens, secured to the bottom of each sash and arranged to raise as the sash is raised, thus protecting the opening. As the sash is lowered the screen drops into a pocket below the belt rail, which pocket is protected by the top channel of the screen to guard against the possibility of rubbish being thrown into it. At the doors there are additional screens, placed inside the windows and covering the full opening, both the lower sash and the stationary top sash. These screens are hinged to swing into the interior of the car. The ends of the car are semi-circu-



CENTER-ENTRANCE TYPE. The seating arrangement of the car is well-adapted to interurban service, in which a majority of the passengers travel for comparatively long distances, the car being so designed that a large part of its passengers are provided with cross seats



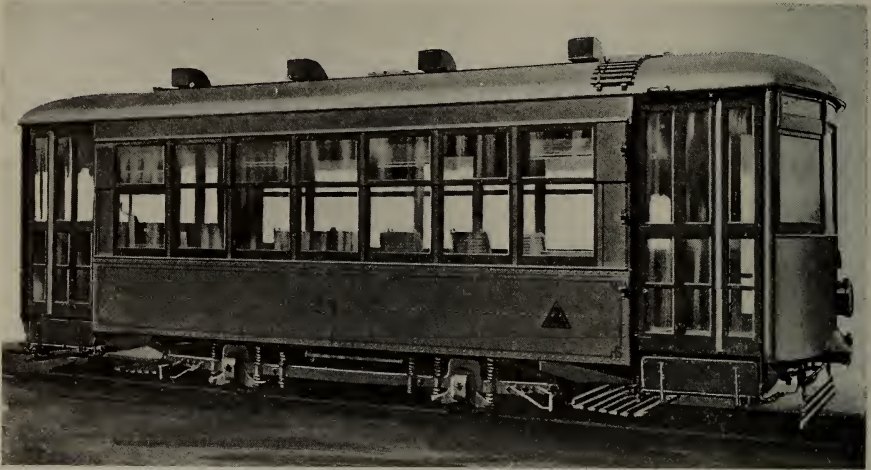
CENTER-ENTRANCE TYPE. At the doors diamond-mesh screens are used to protect the glass, the screens placed both inside and outside the window

lar in shape, a $3\frac{1}{2}$ by $3\frac{1}{2}$ by $\frac{5}{16}$ -in. angle bent in a semi-circle and each end fastened to the side sills and trussed crossings as well as to the side girders. As additional support there are two knees of 6 by $3\frac{1}{2}$ by $\frac{5}{16}$ -in. angle, the 6-in. leg horizontal and extending under the side sills for a distance of about 3 ft. 6 in., running diagonally to the corner piece angle, to which they are riveted, first passing through the trussed crossings or end sills.

The underframe of the car is built of structural steel shapes, the side sills 6 by $3\frac{1}{2}$ by $\frac{5}{16}$ -in. angles and the bolsters built up of two pressed steel channels, $8\frac{1}{4}$ in.

overall in the center, $\frac{1}{2}$ in. thick with a $\frac{5}{8}$ by 10-in. top cover plate and a $\frac{3}{4}$ by 10-in. bottom cover plate, both top and bottom plates being bent to come under the side sills. On each side of the steps there are trussed crossings, of 3 by 3 by $\frac{1}{4}$ -in. angle, one at the top and one at the bottom and another used as a diagonal brace.

Between the bolsters and these trussed crossings there are installed 3-in. 5.5-lb. "I" beams, and at the ends of the side sills trussed crossings made up of 2 by 2 by $\frac{1}{4}$ -in. angle, properly turned, serve as an end sill and to support diagonal center knees.



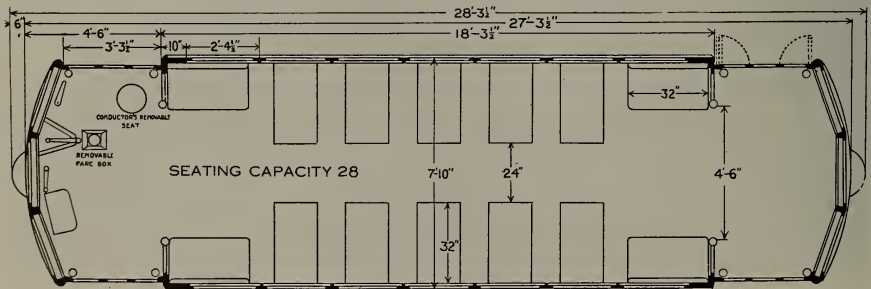
SINGLE-TRUCK TYPE. Seven cars of the type shown, mounted on Brill 21-E trucks, will be put into operation in Beaumont, one of the leading ten cities of Texas

SINGLE-TRUCK CARS FOR BEAUMONT

BRILL 21-E TRUCKS

THE American Car Company, of St. Louis, has completed seven 18 ft. 3½-in. closed, light-weight, single-truck cars for the Stone and Webster Engineering Corporation, to be used on the lines of the Beaumont Traction Company, of Beaumont, Texas. Beaumont is a city of about 24,000 population, located in Jefferson

County, in the southeastern part of the state, separated from Louisiana only by Orange County, and ranking among the first ten cities in Texas. Its initial prosperity came in the development of the great lumber industry of Eastern Texas and when oil was discovered in 1901 the place received a tremendous impetus, springing into promi-



SINGLE-TRUCK TYPE. Height from track to underside of side sills, 21½ in.; height from underside of side sills over trolley boards, 8 ft. 5½ in.; height from floor to center of headlining, 7 ft. 8½ in.; track to step, 15 in.; step to platform, 12½ in.

nence and being the means of the making of many fortunes. The principal industries are petroleum production and refining, rice mills, lumber and iron works.

The situation of the city, but a comparatively few miles from the Gulf of Mexico, gives to it a natural advantage for successful agriculture, and through the conversion of the great surrounding prairie sections into rice fields the growing of that commodity has become one of the chief industries. The city has good railroad backing, the lines of several roads radiating from it to other important Texan points.

The new equipment will be used for both additions and replace-

ments, the company operating at present twenty-three single and double-truck cars, all under two-men crews, which method of operation will be used on the new cars also. The new cars differ from the old equipment in that they are of steel construction, whereas the old cars are of wood and are swung higher from the ground, being mounted on 33-in. wheels, while the wheels under the new cars are but 24 in. in diameter.

The business of the company is fairly uniform throughout the year except as it is affected by general conditions of prosperity. The winters in Beaumont are comparatively mild and do not have any particu-



SINGLE-TRUCK TYPE. The use of the prepayment method of fare collection on these cars will mark the first use of that method of collection by the company

larly depressing effect on the traffic. The prepayment method of fare collection will be put into use on the new cars and will mark the first use of that system on the lines of the company.

4-lb. channel iron riveted to the end cross sills and the dasher angles. The wheelpieces are somewhat heavier, of 2½ by 4 by 5/16-in. angle, thus making the car amply strong to stand the strains put upon it.

There are seven windows on each side of the car, the top sash stationary and made in one continuous piece.

NEAR-SIDE, ONE-MAN CARS FOR PHOENIXVILLE, VALLEY FORGE & STRAFFORD OPERATED AT BOTH ENDS

TWO one-man, near-side cars built by The J. G. Brill Company for the Phoenixville, Valley Forge and Strafford Electric Railway Company are of particular interest because of the fact that they are designed for double-end operation. In the majority of cases where near-side cars have been put into service the lines have been those which have turning facilities at the terminals and

therefore the cars have been built, in these cases, with one end closed, or, in other words, designed for single-end operation. Thus those cars are given a greater length of body for the same length over bumpers and as a consequence the rear platform, which has to be left clear of seats in the double-end car, is used as a place for seats to accommodate more passengers.

However, the cars built for the



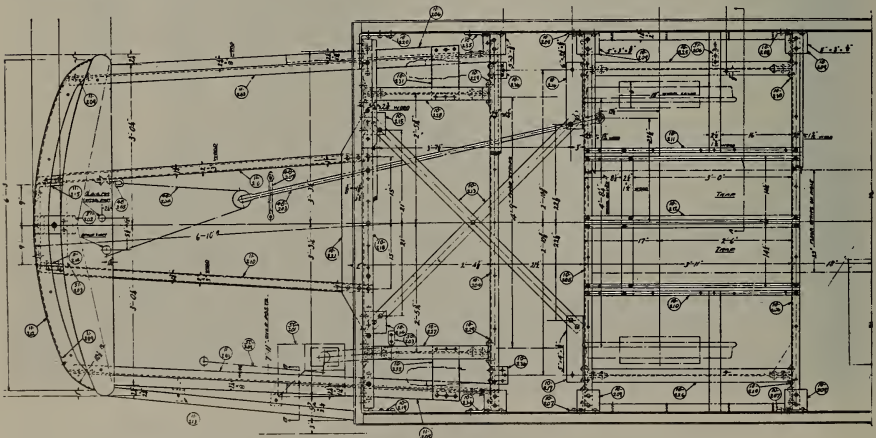
NEAR-SIDE CARS. The use of the Brill Semi-Convertible window system, with top and bottom sash hinged together and arranged to raise into roof pockets, is one of the features of the car



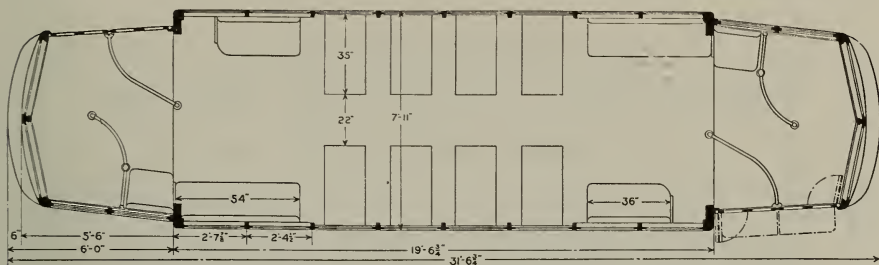
NEAR-SIDE CARS. These cars are of particular interest because of being designed for double-end operation. They will be operated under one-man crews

Phoenixville, Valley Forge and Strafford road will be operated solely under one-man crews, which means that one end of the car will be closed during the entire run, the passengers entering and leaving by the door at the motorman's end of the car. Therefore, the rear door being closed, the space on the rear platform well may be used for standing passengers during peak

load hours. At the end of the run the operation is reversed and what was the rear or dead end of the car becomes the operative end and the other end is closed and that platform space made available for standing room. The cars are almost identical with those built for the Mansfield Railway, Power and Light Company and the Hagerstown and Frederick Railway Com-



NEAR-SIDE CARS. The underframes are built up of structural steel shapes



NEAR-SIDE CARS. Height from track to underside of side sills, 2 ft. 1 in.; height from underside of side sills over trolley boards, 8 ft. 5½ in.; height from floor to center of headlining, 7 ft. 5½ in.; track to step, 13 in.; step to platform, 12 in.; platform to floor, 7 in.; weight of carbody without electrical equipment, 11,842 lb.; weight of electrical equipment, 1078 lb.; weight of truck, 3500 lb.; weight of motors, 3780 lb.; total weight, 22,200 lb.

pany, both of which were described in an article published in the January issue of Brill Magazine of this year.

The one-man method of operation on this car has undoubted advantages. The passengers enter and leave by the forward doors, the rear doors being kept closed during the whole run. Hence the motorman is in a position to see the movements of the passengers and to operate his car safely. At the end of his run he may throw open both front doors as exit doors and thus the car may be unloaded in a very short time. As soon as all the passengers leaving by the front door are clear of the car the motorman shuts the front door and goes to the other end of the car, which now becomes the front or operative end, and takes the fares of the passengers entering.

One of the best features of the car is the installation of the Brill semi-convertible window system, the upper and bottom sash hinged together and arranged to raise into pockets in the roof.

Good ventilation is guaranteed the occupants of the car by the use

of six Brill "exhaust" ventilators, four placed in the body roof and one over each platform. These ventilators are built along practical lines to remove the vitiated air from the top of the car, even when the car is at rest. When the car is in motion the ventilator removes the air to a much greater degree, fresh air being brought into the car at the bottom.

The underframes are of structural steel with side sills of 3/16-in. steel plate reinforced at the top and bottom with angle, the top by 2 by 1 by ¼-in. angle and the bottom by 2½ by 2½ by ¼-in. angle, the end sills made of 9-in. channel and the crossings of 4-in. and 5-in. channel. The crossings are attached to the side plates and angles with special brackets and are secured to I beams which rest on the upper chord of the truck. At each end of the underframe there is a diagonal bracing with a horizontal reinforcing plate, thus holding the frame square and preventing deflecting of the side sills as a result of any shock which may be transmitted to them from the bumpers.

SEMI-CONVERTIBLE TYPE FOR EASTERN PENNSYLVANIA RAILWAYS STEEL UNDERFRAME

THE J. G. Brill Company has shipped to the Eastern Pennsylvania Railways Company, of Pottsville, Pa., a 36-ft. semi-convertible vestibule motor carbody for use on the lines of the company. These lines radiate out of Pottsville

a total of eighty-four cars and controls the lighting business in Pottsville. Manilla Grove and Tumbling Run Parks are owned by the company, adding to its summer traffic.

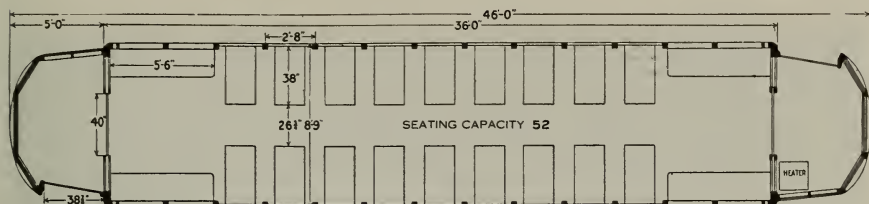
The Brill semi-convertible car well may be called the most



SEMI-CONVERTIBLE TYPE. The car will be operated over the interurban lines of company radiating out of Pottsville, Pa.

and pass through the surrounding coal section, one branch running to Glen Carbon and intermediate points, another to Orwigsburg and intermediate stations, and another to Mauch Chunk, the latter line serving en route Tamaqua, Coal Dale, Lansford and Summit Hill, towns of good size spaced fairly evenly over the lines. The company formerly was the Tamaqua and Lansford Street Railway Company, the new company being a consolidation of eight lines. It operates seventy miles of track with

important type in modern electric railway service, meeting more successfully than any other the requirements of highly developed suburban and interurban service and also city service. Its advantages are unquestionable. It permits for a single investment the operation in winter of a closed car which is warm and snug in the most severe weather and the use in summer of a cool, airy vehicle whose popularity cannot be denied. Then, it does away with the old-fashioned wall pocket below the



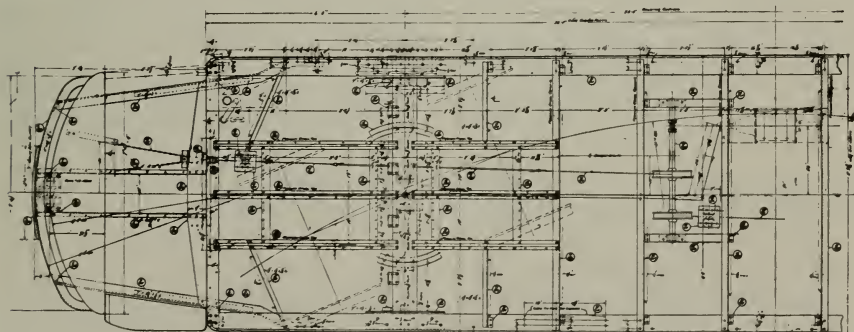
SEMI-CONVERTIBLE TYPE. The use of the Semi-Convertible window system is one of the best features of the design of the car

window rail, which materially reduced the width of the car's interior and had many other serious disadvantages, among them being its tendency to offer itself as a receptacle for rubbish and to make proper operation of the sash into and out of the pocket practically impossible. The semi-convertible system has met with enthusiastic approval throughout the electric railway field, showing that its practicability is without question. One other great advantage is that, in changing the car from the closed car of winter to the open summer car, it is unnecessary to provide a storage place for the sash and panels, they being stored in the roof pockets of the car, which thus is seen to be self-contained.

In the underframe of the car side sills of 7 by $3\frac{1}{2}$ by $\frac{1}{2}$ -in. angle, to

which are riveted at the bottom the $\frac{3}{32}$ -in. side sheets extending to the belt rail, are used. The end sills are of $\frac{3}{16}$ -in. steel plate pressed Z-shape. Six crossings of $\frac{1}{8}$ -in. pressed steel are used in each car. The outside platform knees are of 6-in. 13-lb. channel and the inside platform knees 4-in. 5.25-lb. channel, the bolsters being of steel, with $\frac{1}{2}$ by 10-in. top and bottom plates with $\frac{1}{4}$ -in. webb plate extending the full length of the bolster.

In the body framing vestibule corner posts of oak are used, the vestibule side posts being of ash. In the body of the car the corner posts are of ash $3\frac{5}{8}$ in. thick and the side posts also of ash, $2\frac{3}{4}$ in. thick. The side sheathing of the car is made of $\frac{3}{32}$ -in. sheet steel extending from the underside of



SEMI-CONVERTIBLE TYPE. The underframe of the car is made up throughout of structural steel shapes



SEMI-CONVERTIBLE TYPE. Height from rail to top of floor, 3 ft. 4½ in.; height from top of floor over trolley boards, 8 ft. 6½ in.

the side sill to the belt rail and extending around each corner of the car up to the body door posts.

A plain arched roof is used, running the full length of the car and strengthened with steel rafters, these rafters forged to the shape of the roof and placed so as to relieve the roof of the strain from the weight of the trolley apparatus. A foot at each end of the rafters furnishes a method for fastening.

Eight Brill "Exhaust" ventilators are used, four placed down each side of the car. For the seat-

ing capacity of 52 persons, this shows that, since each ventilator (even under abnormal conditions, that is, operating at less than the average speed of a city car) exhausts enough car to take care of at least eleven persons, the eight ventilators will assure plenty of fresh air to the occupants of the car.

Other Brill specialties installed on the car include stationary steps, Brill patented angle iron bumper, Brill "dedenda" gongs, and "Winner" seats.

Man was made for work. If you haven't firmly convinced yourself of that fact you had better hurry up a bit. You're behind the throng of doers, the men who've realized the importance to them of work.

SUGGESTIVE SUBJECTS

NOTE.—The purpose of these last pages is to supply executive officers with material suggestions—ideas that may prove useful in preparing their printed matter and placards, also pay-envelope stuffers, magazine material for employees, heart-to-heart talks in letters and literature. For such purposes the copyright is waived.

THE NEW YEAR

WE are beginning a brand new year, fresh and bright and spick and span—clean as can be. How long will it stay clean? How long will the numerous good New Year's resolutions remain intact? Longer, let us hope, than they did last year. Stop for a moment and consider that last year. What does it mean to you, now that you look back on it? Are you richer than you were at this time last year?—not necessarily in actual assets, but in the things that really make for your own happiness and that of your wife and your children? What have you done during the last year to boost yourself toward the place you are seeking? Have you been forging ahead or are you merely standing still or sliding gradually backward? Do you know more about your run, your car, the company for which you work, and the many other companies in the electric railway field than you did at this time last year? If not, why not start now on a systematic campaign of self-education along those lines? It will mean dollars and cents to you if you do. Start your New Year right this time, not only with resolutions, but with resolution to keep those resolutions. Stick to them just as you would stick to those that are near and dear to you were they in danger. For your good resolutions are after all a part of your family. They belong. They spell courage when everything looks blue. They boost you along. They help you over the wet tracks of life when the wheels spin and sputter and you seem to be slipping back instead of ahead. Stick to them during the coming year and you'll see what you have done for yourself.

We can't all be Chesterfields and Little Lord Fauntleroy's, but we can make a terribly big effort at being just plain gentlemen. Remember the woman who boards your car with a market-basket on her arm or with a bag of laundered clothes is entitled to just as much respect as the furred lady who deposits her nickel in the farebox simply because James couldn't get the limousine ready on time.

The motorman or conductor who finds time to talk, talk, talk all day and consequently not give full attention to his duties, is most certainly not traveling the proper road to promotion and success. Courtesy to patrons means answering questions, but not following up with reel of conversation. The trolleyman who presumes to entertain his passengers with his own affairs or with meaningless drivel of any kind is hurting himself and his company. The trolleyman must form the habit of speaking when spoken to.

"A penny saved is a penny earned" is a time-worn saying that has been handed down to us from the time of—what does it matter who first discovered it? Whoever he was, he was a wise man, and he has done a lot for mankind. No matter what your wages are, you should be able to save some part of it, and when the rainy day comes, as it probably will, you will be thankful for the wise old saw that first put the saving bee in your bonnet. Do the thing sensibly. Figure out what you can best afford to save and then—save it.

BRILL OFFICES ESTABLISHED ON PACIFIC COAST

ON November 20th The J. G. Brill Company instituted direct representation on the Pacific Slope with offices at 907 Monadnock Building, San Francisco, this arrangement taking the place of the relationship previously existing between The Brill Company and Pierson, Roeding & Company. The establishment of its own Pacific Coast offices and representative by The Brill Company has been deferred for years by reason of the very satisfactory association with Pierson, Roeding & Company. However, the new course, because of its certain desirable features, was an inevitable eventuality. The present time seemed to be best for all parties concerned in the consummation of the change, and therefore the sales organization of The Brill Company has been extended to the Coast, with the hope that the very pleasant relations maintained with the customers of the company through its former agents may continue under the new arrangement.

REVISION OF BRILL MAGAZINE MAILING LIST

THE periodical general revision of the mailing list of BRILL MAGAZINE is nearly completed. Letters and return postcards have been sent to everyone to whom the magazine is mailed each month. Most of these postcards have been returned with the indication that the address is correct and some with requests for changes in the address. There is still a number of the cards which have not been returned and as there is no way of telling whether or not the magazine is being received each month and properly addressed, the return of these cards, which will complete the revision of the list, will be greatly appreciated.

CHANGES OF ADDRESS

THOSE who receive BRILL MAGAZINE are requested to send in any change of address at the earliest opportunity. It will be more convenient in making up the mailing list if the new address is written on the envelope in which the magazine is received. Send to the Publicity Department, The J. G. Brill Company.

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* Storage battery

† Convertible

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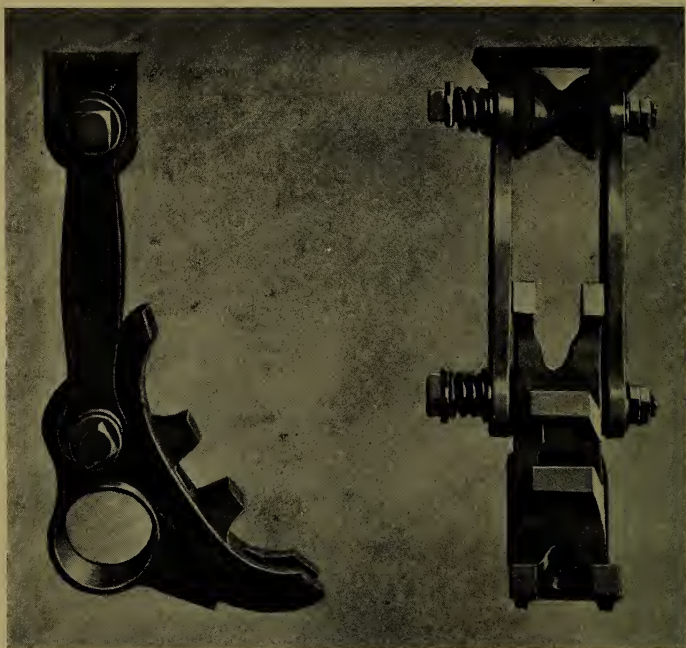
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